Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. ROB'T MCKEAN, Secy.
505 Pearl St., New York.

Monadnock Bldg., Chicago.
6 Bouverie Street, London, E. C.
Unter den Linden 71—Berlin N. W. 7.

WALTER RENTON INGALLS, Editor.

Subscriptions payable in advance, $5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines, $6.50 in Canada.

To foreign countries, including postage, $8.00 or its equivalent, 33 shillings: 33 marks: or 40 francs.

Notice to discontinue should be written to the New York Office in every instance.

Advertising copy should reach New York Office by Thursday of week before date of issue.

Entered at New York Post Office as mail matter of the second class.

Cable Address, Engminjour, N. Y.

CIRCULATION STATEMENT

Of this issue 9000 copies are printed.

None sent free regularly, no returns from news companies, no back numbers. Figures are live, net circulation.

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The Engineering and Mining Journal

Vol. 93. JUNE 29, 1912. No. 26

The Situation in Spelter

Great strength has continued to prevail in the spelter market, the demand for this metal having been surprising and the failure of new production to develop having been disappointing. Not only has the new smelting capacity been slow in materializing, but also the supply of ore, especially of high-grade ore, has been less ample than is desirable. The strength of the market is, we think, based on these conditions and the conviction among consumers that the smelting capacity is likely to be diminished by troubles in the gas fields about as rapidly as it is increased in the coal fields, at least for a considerable time to come. In no other way can we explain their willingness to contract for their requirements an unusually long way ahead.

The failure of the gas supply of Kansas and Oklahoma was foreseen a long time ago and such a pinch as we have lately been experiencing was expected, but not exactly as it has come about; in other words, the operation of the economic factors producing it was delayed and drawn out more than was anticipated, and there were several relaxations from the early pinches and restorations of comfortable conditions before the acute and prolonged stringency became developed. This was not unnatural. It is indeed the ordinary course of a disease, either physical or economic. In this specific case, a supply of natural gas does not fail all at once. It becomes feeble and costly until most users are induced to give up the struggle for it, but after their retirement there is likely to remain one survivor who manages to get along for a time on the remnants, no longer harassed by the drafts by his competitors. Thus it has been at Iola. In other places the Kansas Natural Gas Co., a great exhauster of gas, has retired from fields that it could no longer suck advantageously, and has left the smelters with a squeezed orange but an ability still to get something from it without interference. Some of the smelters retreated to Oklahoma, where they have been unmolested, but there can be no doubt that sooner or later the Kansas Natural Gas Co. will pursue them there, in spite of state prohibitions, and the same acts will be repeated. In brief it is the same old story of the extinction of the buffalo, the stripping of our forest lands and the skinning everywhere of the virgin resources of the West.

In a general way the exhaustion of the natural gas of Kansas and Oklahoma was foreseen 10 years ago, but we became so familiar with the cry of wolf at the door that we did not believe in his presence when he really came. Otherwise, we think, the construction of new smelteries in the Illinois coal fields would have been begun several years earlier; and even later the existing smelters would have added more new furnaces to their plants than in fact they have done.

The use of natural gas in Kansas and Oklahoma has not been attended by the wastefulness that characterized an earlier era in Ohio and Indiana, but the smelters are in some measure responsible for their present troubles. It is true that wells were not allowed to blow off into the atmosphere and gas was turned off when not required, but the methods of using gas in smelting were, and still are, wasteful. For a long time no definite information respecting the consumption in smelting was possessed, but even after that knowledge was obtained a type of roasting furnace that is a great gas-eater was persistently retained. This is a particular plague now, when gas is short, the effort to obtain relief from which is exhibited in the strong demand for calamine ore, which does not need to be roasted.

The deficiency in ore supply is likely to be corrected more quickly than the deficiency in smelting capacity. The Joplin district proper seems indeed to have attained about its maximum, its output

for many years recently having been about 275,000 tons per annum, plus or minus about 5%. In 1911 it was 268,500 tons, including both blende and calamine. The choicest part of the blende of this district is taken by smelters who produce sulphuric acid as well as spelter, or who produce a superior grade of spelter, and the competition among them creates a market price for this ore that nominally leaves but little, if any, margin of profit to the smelters. In fact the miners receive payment for the sulphur value of their ore, although such does not appear specifically, being represented rather by what would otherwise be an unduly high price for zinc.

Even this does not seem to stimulate any significant increase of production in this district. On the other hand the outputs of Oklahoma and Wisconsin are forging ahead rapidly, and beginning with this year we may also expect to see an important gain on the part of Tennessee, which also will produce a high grade of ore.

Among the districts west of the Rocky Mountains, the results have been rather disappointing, save at Leadville and Butte. Aside from these there is no district that exhibits any regular progress. In 1911 Colorado made the largest increase of production of any of the states. This was chiefly due, however, to the swelling output of calamine by Leadville, which is a low grade of ore and consequently does not add rapidly to the make of spelter. Not so with Butte, where there was also an important increase in 1911. The ore of its mines is of good grade and of good quality. The Butte & Superior mine seems to be second in magnitude only to the Franklin mine of the New Jersey Zinc Co., and with its new concentrating mill that has just gone into operation it will unquestionably make a much larger production in 1912. Besides the Butte & Superior the Elm Orlu mine is already a producer, while the Anaconda company is a potential producer. It is, we believe, only a matter of a year or two before we shall see Butte turning out 150,000 tons per annum of ore of about 50% grade. This, together with the increasing outputs of Wisconsin, Tennessee and Oklahoma, should prevent danger of ore shortage.

It seems, however, that the present situation in the spelter market is likely to run on until there is a material accession to the smelting capacity, the provision of which is slow. We might even expect to see the price for the metal soar above 7c., were it not for the relief which Europe can offer. There is evidently an abundance of spelter over there for sale at the present price of about £26, which is 5.65c. per lb. A little further advance in our market will enable European spelter to be imported with payment of duty of 1⅜c. per pound.

The Price and Prospects of Silver

Notwithstanding comparatively light shipments to India, silver has continued to hold the advance which began in December last, and which has carried the price up to over 60c. in New York. The average price for the month of May was 60.88c. in New York and 25.038d. in London, these figures being, respectively, 7.573c. and 3.455d. above those for May, 1911. The advance is apparently due to anticipation of a large coming business rather than to the immediate demand and is not altogether speculative. It is true that the Indian group which carried so much silver last year is still in the market, but its activities have been directed more to steadying the market than to forcing it up. The present strength is shown by the fact that the 900,000 oz. or more lost in the wreck of the "Oceana" some three months ago have been recovered and sold by the underwriters without in the least affecting the market.

The sales to India have been undoubtedly affected this year by the large shipments of gold from London to that country, which for the first four months of this year amounted to £7,088,315, or £2,481,165 more than in the corresponding period of 1911. Present indications are for another prosperous year in India; but whether the substitution of gold for silver in the exchanges will continue to so large an extent is problematic. The custom of centuries in the East does not change in a year or two, and a very large proportion of Indian wage earners are still too poor to require gold either for currency or hoarding. There is every prospect that they will continue in that condition for a long time to come.

The present strength of the market appears to depend largely on the prospect of heavy financial transactions with China and upon the success of the new government, which is expected to result in a reform and unification of the currency and in an increase of prosperity and trade. The loan, at any rate, is assured and the operations connected with it will require the remittance of a large quantity of silver.

Stocks of silver held in London just now are large; they are estimated by good authorities at more than £3,000,000 or 75,000,000 oz. Only a part—perhaps a comparatively small part—of this accumulation is in speculative hands. A large part is held in anticipation of exchange operations in connection with the new loan. Moreover, in the present condition of the money market it probably costs less to buy and carry the silver itself than it would to extend contracts for future delivery. It does not appear probable that the market will give way to any considerable extent for some time to come.

That the steel trade is not in as depressed condition as some people would have us believe, is shown by the improvements and additions to plants arranged for or actually begun by several large producers. In the Pittsburgh district, the Steel Corporation, the Republic Co. and several other new plants will add about 2,500,000 tons yearly to the capacity of the district for making open-hearth steel. From this total, however, must be deducted the bessemer converters which are to be dismantled at the Edgar Thomson works; but the net addition to steel-making capacity will be not far below 2,000,000 tons. Besides this, the Steel Corporation is starting to build additional mills at Gary, and to put $6,000,000 into the Minnesota Steel Works, at Duluth. All this is doing pretty well for a declining and profitless industry.

During recent months the conditions prevailing in the copper market have been psychologic rather than economic. Consequently the sensational break in the market this week tells us only that for the moment some persons wanted to sell more copper than would be taken except at a concession in price. As to the why and wherefore of this, who knows? It still remains to be seen, we think, on what level the market is going to stand when economic factors alone will govern.

By the Way

One of our contemporaries reports that Canadian patent No. 138,432 covers "an explosion and the method of producing it." Should think the patent would be badly damaged after a little blasting.

"Thomas," said the professor, "mention an oxide." "Leather," replied Thomas. "What is leather an oxide of?" "An ox'ide of beef."—Chicago *Evening News.*

"The impression is growing that an important factor in the steel market is the fact that steel products have been selling ex-Gary dinners"—so says the New York *Times,* a persistent advocate of controlled markets.

In speaking of compressed-air locomotives, *Echo des Mines* says that one rather unlooked-for result of the compressed-air locomotive is that the workings are rendered more healthful and cooler through the expansion of the air in the locomotive.

One of our contemporaries suggests the use of sodium hyposulphite in the determination of sulphur, for reducing ferric iron so that there will be no solvent action on the precipitated barium sulphate. We earnestly recommend the method for smelters who penalize sulphur.

"Supposing," said the examiner, "you had renewed the manhole gaskets, had tightened up the nuts on the manhole dogs and had got 125 lb. of steam, what would you do if a dog came off and the handhole plate fell in?" "I'd go in after it," answered the candidate. "Any plate that could fall in against a pressure of 125 lb. would be worth going after."

A recent novelty in the treatment of the asphaltic residues of the oil refineries which should appeal to the metallurgist, is that of bessemerizing them. This process, according to the Geological Survey, produces a sticky, and to some extent, an elastic material. This has been used for roofing, and to a small extent for rubber substitutes. We hope this is not a hot-air process.

While visiting the Calumet & Hecla Hospital at Calumet, says the Detroit *Saturday Night,* a visitor paused at the bed of an injured miner and solicitously inquired as to the nature of the man's injury and the cause of the accident. The Cornishman had broken his collarbone and was nothing loath to describe his accident. "You see, zur," he said, "it ware this way. Ah ware workin' oop in the shawft 'ouse. Just as Ah ware about t' step ont' plank, the bloody plank warn't there, and doon Ah went, plank an' all."

The following summary of Porcupine is credited to a man who was interviewed some months ago by the Montreal *Star*: "There are two good zones there and five or six exceedingly promising mines. The rest of the ground looks like a fine place to grow potatoes." In corroboration of this now appears the following in a Porcupine paper." "The Porcupine Lake Gold Mining Co., known locally as the Hunter property, has made a nice find, free gold being shown in the schist and quartz, which is a *palfrite* formation. There are two diamond drills working on these claims and the results have exceeded all expectations. *A nice clearing has been made on this property of about seven acres and manager J. T. Westron is having it sown with potatoes and other vegetables.*"

An engineer relates an amusing incident experienced while traveling over a remote mule trail in Central America when a revolution was about to break out. He had no passport and such a document was demanded before he was permitted to proceed. Having anticipated this he carefully preserved an advertising circular in which the printed matter was bordered by an elaborate scroll. It looked much like a college diploma, but only extolled the virtues of a brand of lubricating oils. Scrawling his name in a blank provided for that purpose the engineer presented the advertisement to the first colonel that demanded it. Fortunately that soldier could not read and the bearer was permitted to proceed unmolested on has way.

What some of us dreamed during high-school and college days as the life of an engineer was doubtless far different from what was actually encountered. On the whole, engineering is an interesting and fairly profitable profession, and yet it is not all a cinch, as many engineers can testify especially when they recall the earlier years of their professional career. A young engineer recently contributed to the *Sun* his experience which, we venture, is not an uncommon one in these days when the colleges of the country are turning out a new batch of graduate engineers, each June. This particular engineer records his discouraging experience as follows: "I have been out of work for nearly five months. It occurred to me that my experience may be of value to young men who contemplate entering the engineering profession. I received my education in a good school and had no difficulty in obtaining work on the engineering corps of railroads here and in the West at salaries ranging from $60 to $120 per month. Three times in the six years following graduation I was let out on 'indefinite leave of absence' because winter had set in, the appropriation ran out, or because a new régime, seeking a record for economy, always lops off the engineers' heads first. Not once have I lost a position for incompetence. I am now 30 years old, out of a job, with a profession which my past experience has proved to be unstable. Nor has my experience been exceptional. Have taken counsel with myself, decided to give up engineering, and try another line; but what? I may become a salesman, or learn enough stenography or typewriting to hold a steady position. This is certainly a lovely finish to the ideals accompanying the sheepskin. However, as I said, my object is not to register a calamity howl, but if possible to deter those youngsters who, inspired by pictures of 'engineers on the job' may fancy engineering a splendid, noble, lucrative profession. Splendid, yes, but far from lucrative. Thousands of men, who are in business and can't tell a cosine from a sump, are making salaries which are dazzling compared to those grudgingly paid to worried, hard working engineers."

The Radium Extraction Co. was organized to work the "immense tonnage of low-grade ores" of uranium and vanadium, discovered at Mount Paynter, South Australia, by Dr. Douglas Mawson. In addition to the immense deposits, there were alleged to be not less than 250 tons of 5% ore in the neighborhood of the company's No. 6 shaft. As a result of careful sampling, this latter quantity has dwindled to 30 tons, carrying under 5%, while the 1% ore has come down to "splashes" in irregular crevices (*Min. Journ.*, June 8, 1912), with no evidences of pitch blende or any orebody. The company funds are down to £1015 and authority is asked to dispose of the mines for anything that can be gotten. American radium investors please paste this in their hats.

On the maps of the coal fields of the United States, there is shown in the northern part of North Carolina a narrow belt in the Piedmont plateau, which is called the Dan River coal field. Although the region has been known for over a century, there is no record of coal produced from it. Speaking of a portion of this field, R. W. Stone says: "The bright, black carbonaceous shale exposed in a number of prospects at Walnut Cove is believed by some of the residents of that village to have fuel value, although none of them use it. . . . . I endeavored to burn in an open hearth some of the freshly mined mineral. Although the brightest, blackest lumps were kept red hot on a wood fire for several hours, they would not burn." And in conclusion: "After a thorough and careful examination of the Triassic beds in the Dan River field, the conclusion is reached that there is no reason to expect to find commercially valuable coal beds in this district. The beds of semi-anthracite found near Walnut Cove and near Leaksville are only a few inches thick and of small lateral extent. Being both thin and discontinuous, they are wholly unimportant. It is, therefore, useless to expend money and energy in this region in the hope of developing a coal mine."

Conditions at Tonopah

TONOPAH CORRESPONDENCE

The production of the Tonopah mines for May amounted to 37,302 tons, contributed by the following companies: Tonopah Mining, 14,948 tons; Tonopah Belmont, 7956 tons; Montana-Tonopah, 4611 tons; Tonopah Extension, 4497 tons; West End Consolidated, 3206 tons and MacNamara, 2084 tons. All of these companies are operating their own milling plants, amounting in all to 260 stamps and the above figures represent their present general average monthly production. This tonnage will, however, be greatly augmented by the operation of the new Belmont mill, which is expected to start in about two weeks and which will have a capacity of 15,000 tons per month.

DISCOVERED IN 1900

Tonopah was discovered in May, 1900, and from the time that operations were commenced, by leasers, in December of that year, to the end of April, 1912, it has produced $51,527,283, and six companies have together paid $13,003,559 in dividends. No company's ore resources have yet been exhausted, although the Tonopah Mining Co. realizes that owing to the cutting off of its orebodies by an intrusion of glassy trachyte, its operations may not last many years longer. The original discovery in the camp showed only four parallel outcropping veins, the extension of these on both their eastern and western course being covered by a later volcanic flow. In the 160 acres comprising the first locations, there have been developed 22 veins in all and in the Montana-Tonopah seven veins parallel to these, with other veins both east, west and north.

The producing area of the camp, measured from the extreme western workings in the Tonopah Extension and West End mines to the extreme eastern workings of the Belmont mine, is 8100 ft. long and 2700 ft. wide. In length it is practically continuous and is extending both west and east, more particularly on the east, where ore developments in the Mizpah Extension mine at a depth of 1000 ft., and in the Halifax mine, at a depth of 1300 ft., show that both mines will be productive. Both these properties are east of the Belmont mine and constitute an important extension of the eastern ore zone this month, demonstrating the continuation to the east of the different veins developed in the Tonopah-Belmont ground.

The deepest workings in ore are 1476 ft. in the Belmont mine and the veins and the ore-bearing trachyte have not yet been bottomed. This ore-bearing formation was covered by 800 ft. of cap rock which, in the Halifax mine, adjoining on the east, was sunk in for 1275 ft. before the trachyte was encountered, and in the Mizpah Extension, adjoining the Halifax on the north and a portion of the Belmont on the east, the trachyte has not been entered, although a depth of 1300 ft. has been reached. In the Mizpah Extension, as in the Montana-Tonopah, veins of rich ore have been opened in the West End rhyolite, and, on the western ore zone, this formation, as well as the trachyte and also the contact between these two, carries large bodies of payable ore.

In the original discovery, owned by the Tonopah Mining Co., and immediately east and west, and north and south, all the orebodies are greatly faulted, but this faulting is less frequent in the extreme east and west workings of the district. The orebodies vary in width from 6 ft. to silicified zones 160 ft. wide, much of which is not commercial, but in which oreshoots have been developed from 20 to 50 ft. wide and from 200 to 900 ft. long, the latter in the Belmont mine. The nature of these orebodies renders the estimation of possible ore reserves a difficult matter. In addition to the six producing companies mentioned, there are nine properties being vigorously prospected and from the position of these in relation to the proven orebodies, it is reasonable to predict that some of them will develop the extension of veins already shown in adjacent claims.

Senate Asks for Steel Industry Data

WASHINGTON CORRESPONDENCE

A curious situation has been created in the Senate as a result of the resolution passed some time ago in which President Taft was asked to furnish Congress specifically with the figures showing details of the capital, income, corporation taxes, etc., of the companies engaged in the iron and steel business. These figures have never been given in segregated form by the Division of Internal Revenue in the Treasury, which was the reason for calling for them. President Taft, however, recently returned an answer in which he stated that he could not understand what corporations were intended.

This led to the offering of another resolution by Senator Hitchcock in which it is stated that the corporations engaged in the iron and steel industry regarding which information is desired are the 1048 corporations embraced in the Census Report for 1910. The resolution also requests that the Bureau of Corporations and the Census Bureau be required to aid in the inquiry asserting that they possess valuable data.

It is believed the resolution (which will shortly be passed) will give publicity to more details about the income of corporations engaged in the steel business than has heretofore been available.

Northwestern Metals Process

The Northwestern Metals Co. is erecting a plant near Helena, Mont., for the treatment of mixed sulphide ores. We are informed that a large part of the equipment is now in place and the remainder is being installed as rapidly as possible. The management of the company expects to have the plant completed and ready for operation by the coming fall.

The process of this company in the main is as follows: Chlorination with dry chlorine gas in a revolving cylinder, the chlorine being obtained from electrolytic cells. This chlorination converts the metals to chlorides and liberates sulphur, which is distilled off and collected as brimstone. Leaching of the chloridized ore with hot water, and filtering off the solution. Precipitation of iron and manganese by means of chlorine gas, caustic-soda solution and zinc oxide, and removal of the precipitate. Precipitation of gold, silver, copper and lead by agitation with zinc shavings or zinc dust, and removal of the precipitate. Precipitation of the zinc by means of a solution of sodium carbonate. The sodium carbonate is obtained by showering caustic-soda solution from the chlorine cells through carbon dioxide, which, in turn, is obtained from scrubbed and cleaned boiler chimney gas. The sodium chloride remaining after precipitation of the zinc is passed through an evaporator, where it is brought up to the proper degree of concentration, and is then returned to the chlorine cells.

New Keystone Copper Company

Operations at the New Keystone mine for the year ended June 1, 1912, were confined entirely to churn drilling, by means of one drill working on the day shift only, according to J. Parke Channing's report to the Board of Directors. In all, 19 complete holes were drilled, numbering 32 to 50, inclusive, the total length of holes amounting to 7840 ft. The previous total drilled was 14,107, making the total to date, 21,947 feet.

In addition to this, as reported last year, there exists upon the property a main shaft 330 ft. deep, 12,238 ft. of drifts, and 2318 ft. of raises and winzes. The main object of drilling was to prove the area lying to the west of the previously developed ore, and to define more clearly the orebody within the previously assumed limits.

Of the 19 holes drilled, 16 encountered ore, and the total ore developed to date, including development both by underground work and drill holes, amounts to 2,516,000 tons of an average grade of 2.25% copper. Churn drilling is still being continued at the western end of the property, toward the Live Oak line.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

Food Supply for Miners

In view of the discussion concerning food consumption by miners, the following list of food consumed during one week by a party of 10 men and a cook, on Coronation Island, in southern Alaska, in July, 1904, may be of interest. These men were developing a small prospect,

WEEKLY FOOD SUPPLY FOR 11 MEN

	Price per Unit	Total Cost
25 lb. fresh beef	$0.13½	$3.31
2 lb. dried beef	0.22	0.44
4 lb. bacon	0.16½	0.65
8 lb. mess beef (corned)	0.12	0.96
8 lb. pork	0.19	1.16
2 cans roast mutton	0.25	0.50
1 can lunch tongue	0.20	0.20
25 lb. ham	0.13	3.25
1/5 keg pigs' feet	2.25	0.45
2 lb. codfish	0.09¼	0.19
4 cans oysters	0.19	0.76
19 doz. eggs	0.27	5.13
1 gal. can tomatoes	.....	0.30
1 qt. can tomatoes	.....	0.09
4 cans string beans	0.10	0.40
3 lb. lima beans	0.06½	0.19
2 cans peas	0.10	0.20
3 lb. cabbage	0.04½	0.13
3 cans corn	0.12	0.36
3 lb. parsnips	0.02½	0.07
10 lb. beets	0.02½	0.23
1 lb. beans	.....	0.05
½ crate lettuce	.....	0.75
1 gal. pumpkin	.....	0.30
125 lb. potatoes	2.25	2.71
10 lb. onions	0.04½	0.43
3 qt. cans peaches	0.20	0.60
9 qt. assorted fruits	0.20	1.80
1 gal. pears	0.31	0.31
2 lb. evaporated apples	0.08½	0.17
1 gal. cherries	0.40	0.40
5 lb. dried figs	0.10½	0.51
25 cans Carnation cream	0.10	2.50
30 lb. sugar	0.07	2.10
7 lb. coffee	0.32¼	2.26
1 lb. tea	0.40	0.40
100 lb. flour	.....	3.10
10 lb. rolled oats	0.04½	0.43
10 lb. graham flour	0.03½	0.33
2 lb. cornstarch	0.05	0.10
1 lb. rice	0.08	0.08
1 lb. hominy	0.09	0.09
1 pkg. gelatine	.....	0.10
1 lb. baking powder	0.41	0.41
1 lb. crackers	0.10	0.10
2 lb. cheese	0.18½	0.37
1 pkg. yeastfoam	0.05	0.05
1 qt. molasses	.....	0.15
½ gal. syrup	1.31	0.66
10 lb. lard	0.11½	1.12
15 lb. butter	0.30	4.50
20 lb. deer (or beef)	.....	2.60
1 doz. pickles	.....	0.18
Spices, vinegar, extracts, raisins, currants	.....	1.50
		$50.13
Food consumed per man, $4.56.		
Wood, oil and soap, 50c. per day	.....	$3.50
Cook per day, $1.50 and board, which is included in above 10 men and cook	.....	17.50
		$71.13

and were charged $1 per day for board. The endeavor of the company was to make the board as good as possible and yet to conduct the boarding house with as little loss as was consistent with conditions. The location made prices somewhat unusual, and also resulted in the use of certain articles of food which are not common. The island was visited every two weeks by a steamer which brought in fresh beef. When the fresh beef was exhausted, and this had to be used within a week after it was received, as it would not keep longer, canned and dried meats and fish took its place. Occasionally a deer was shot, but in figuring costs the deer meat is charged at the same price as an equivalent weight of beef. The price per unit, as well as the total cost of each item, is given for convenience of others who may be figuring on supplies.

GEORGE A. PACKARD.

Butte, Mont., June 18, 1912.

Government Tests of Wire Rope

The Bureau of Standards has decided to make a series of tests upon wire rope and desires the coöperation of the manufacturers, engineers and users of this material. They are invited to state just what tests should be included, in their opinion, and also to give suggestions as to the conduct of the tests.

Some of the points that naturally suggest themselves are as follows:

(1) What should be proposed as a standard tensile test?

(a) Proper length of specimen, taking account of that critical length over and above which the strands will act as a unit.

(b) Type of end sockets or connection.

(c) Elongation, etc.

(2) What importance should attach to the torsion test? (Some authorities believe this to be superfluous) and what should be a standard test for torsion?

(3) What is suggested in the way of cold bend test over the usual methods.

(4) Little has been published in the matter of impact tests. It would seem as if this field is important and recommendations are desirable.

(5) What should be done in the matter of abrasive tests?

(6) Biggart, Stone and others have proposed and made tests in which the life of cables, and other properties, are investigated by passing them over a series of pulleys direct and reversed, the cables being subject to different direct tensions. What is the relative value of such tests, and how should they be carried out?

(7) Samples of cables have been taken under actual service conditions after a number of years' usage in mine or elevator service, and tests compared with the unused original material. Is anything in this line desirable?

(8) Are any other physical tests necessary?

(9) Chemical tests will be made. What are the suggestions in this respect?

(10) What number of duplicate tests is suggested for any one type or specimen? Tetmajer used two in his tests. Three would seem more desirable. For the individual wires he used eleven. Would not a lesser number, say six, be sufficient?

In conclusion, we shall be very glad for an expression of opinion as to what portion of the above mentioned points as they relate to tests shall have weight, also to have you mention any other features that will naturally occur from your experience. In any future publications made, appropriate credit for individual ideas will be given.

JOHN H. GRIFFITH,
For the Director of the
Bureau of Standards.

Pittsburgh, Penn., June 3, 1912.

The Slime Problem

In the JOURNAL of Apr. 27, the leading article on the slimes problem is exceedingly timely. Slimes are the bugbear of the base-metal mines, and if losses could be prevented and the mineral efficiently recovered, it would double the dividends of many of the largest and best mines on the continent. The same conditions existed up to recent times among the precious-metal mines with as dreary prospect of relief as now exists among the base-metal and refractory-ore mines, and I have long been impressed with the necessity of an economical and efficient method of extracting metallics from impalpable slimes. With this end in view, I have worked assiduously to find a remedy.

While plenty of good apparatus exists for the treatment of such material when granular, no matter how fine it is, for slimes of impalpable fineness no remedy has been hitherto available.

Believing the remedy would only be found in centrifuges that would multiply any suitable separating action, I have directed diligent and constant research in that field for several years, and the later results of this research appear to produce the desired remedial method. Centrifugal machines are by no means new; the past has produced endless numbers of them and among them not a few concentrators, all of which are deficient in principle and results. Centrifugal force and action are tractable and can be made to produce any movement or action it is desirable to perform and the previous undiscovered potentialities of this peculiar and useful force will astonish the average engineer, and even those who have hitherto considered themselves familiar with

the subject. The machine herewith illustrated embodies entirely new principles that promise to overcome all previous difficulties and obstructions and makes possible a more general application of centrifugal force in treating ores by various methods.

In this machine, simplicity is the predominating feature, requiring small power. It contains but one movable member, a rotating centrifugal, which is illustrated by Fig. 1, in which *A* is the driving pulley, and *B* the inlet for the material to be treated. *C* is the centrifugal containing the diaphram *C'*, with an annular discharge opening *C"*. *E* is a centrifugal vacuum pump which accelerates and regulates the flow of liquid through the machine.

The member described is encased in a pressure chamber, Fig. 2, with a regulated discharge opening *F*, for the separated material, and a fresh-water inlet *G*.

When the pressure chamber is filled with liquid, and the centrifugal rotated at suitable speed, a pressure is caused in the chamber, due to the rotation of the centrifugal, and the latter rotates under pressure proportional to its speed. The discharge opening *F* being closed, the liquid entering the centrifugal at *B* will pass through the centrifugal and discharge at *E* with no discharge at *C"* unless there are solids or substances which are heavier than the surrounding liquid. If this is the case, such material will pass through the annular discharge *C"* into the pressure chamber, and the solids will displace an equal volume of water which must enter the centrifugal at *C"*. This illustrates the possibility of solids passing out of the centrifugal against an inflowing current, and with the discharge open at *F* the liquid current is outward as well as the solids. Then if it is desirable to have the solids discharge against an inflowing current, water or washing liquid can be supplied through the opening *G*, and in this manner an inward flow into the centrifugal may be maintained at any desired velocity while the solids are being thrown outward against the inflowing stream into the casing. It is this principle that is utilized to separate metallic particles from the fine nonmetallic substances in the slimes, and also to separate solutions from treated cyanide slimes, or saccharine solutions, and wash the residues at one operation. The inflowing current is utilized only when it is desired to separate one solid from another or to wash the residues; otherwise the solids with sufficient liquids to carry them away, flow outward at *C"*. When it is desired to separate solids from liquids or turbid water or to thicken slimes, the amount of discharge at *F* will regulate the amount of solid or thickened discharge at *C"*, as well as regulate the consistency of the thickened material. By this action the stream entering the machine is separated as it flows through the machine and there is no accumulation in the machine to complicate its action and to increase strains, and but moderate speeds are employed. When it is merely desired to thicken slimes or separate solids contained in liquids, the centrifugal *C'* will have radial ribs above and below the diaphragm *C'*, but in separating one solid from another, no ribs will be placed above the diaphragm *C'*. For the latter service low speeds are sufficient.

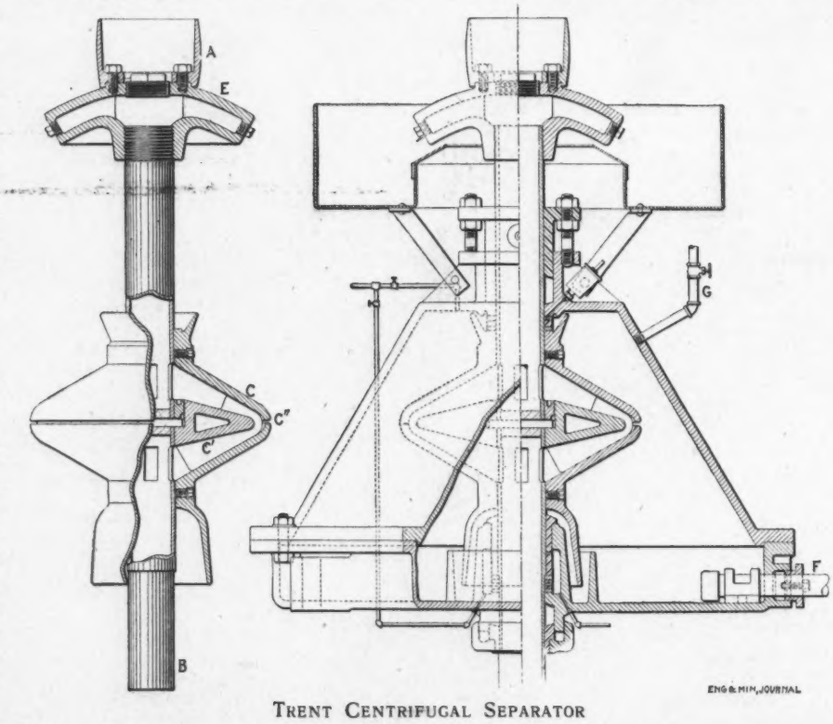
The same principle may be utilized to separate solids from any liquids, or one liquid from another, such as cleaning and dehydrating crude and other oils, also for purifying water and separating the solids from sewage, and for recovering water from tailings or factory refuse. The same principle may be applied to separating dust and other solids, or humidity, from air and gases for purifying gases, and it has many other applications. The principle is patented in various forms and is adapted to all forms of liquid separations and washing residues.

The machine is noncumulative and is continuous in action and is the only centrifugal yet produced that can be adjusted to separate rapidly and continuously solids from liquids in large volumes, and that will as readily separate solids of different gravities when they are of impalpable fineness.

The potentialities of centrifugal action are not by any means herein exhausted, for the possible refinements and variations of the above action are numerous, and it is reasonable to expect that the invention described will make it possible for the complete recovery of values from metal-bearing slimes by mechanical means. This machine is submitted to the engineering fraternity for its consideration and criticism.

L. C. TRENT

Los Angeles, Calif., May 15, 1912



TRENT CENTRIFUGAL SEPARATOR

Temperature Correction Chart for Tapes

I note the criticism of F. C. Armstrong, of Boulder, Colo., concerning my article on "Temperature Correction Chart for Tapes," which appeared in the JOURNAL of May 18, 1912, p. 982.

I think Mr. Armstrong misinterpreted the meaning of this chart.

In my former article, I used as an example a distance of 70 ft. in a temperature of 90° F. In a temperature of 90° F., the tape would be too long by 0.013 ft.; this amount, subtracted from 70 ft., will give 69.987 ft., which is the distance as measured with the tape at a temperature of 90° F., so that the distance will measure 70 ft. at 62° F., or the temperature at which the tape is standard.

H. J. RAHILLY.

Douglas, Ariz., June 15, 1912.

A Piece of Practical Forestry

Another interesting development in practical forestry beside the one mentioned by Doctor Raymond, in the JOURNAL of June 22, 1912, is the use of convict labor in New York to run the afforestation nurseries. This seems to me also worth copying.

A. A. NASON.

New York, June 24, 1912.

Sticking to the Job

By E. P. Mathewson*

A few examples from experience are given to prove that keeping hard at work will count in the end, with a short biography of Mr. Mathewson.

Note—The main portion of an address to the graduating class of the Montana School of Mines, at Butte, Mont., June 6, 1912.

*General manager, Washoe works, Anaconda, Mont.

I want to avoid the pedantic style of oratory and talk to you men, as one who has had a little experience in your chosen profession, to those just entering the arena. It has been suggested to me by your worthy president that I give you some account of my own personal experiences and those of friends of mine who have become prominent in the mining and metallurgical world. If you will pardon my speaking of myself, I will give you a brief account of my career.

After graduating from college, I was fortunate in securing a position as assistant topographer on the geological survey of Canada. I had several months' experience in that line, returning home at the expiration of the survey.

Starts in the West

I found nothing in my chosen line of work and so I temporarily took a position as clerk in a wholesale establishment, all the time looking out for something in the profession. Nothing turned up that winter, so I made up my mind, after consulting with some friends, to try my fortune in the western United States.

I obtained a letter of introduction from the late Dr. T. Sterry Hunt to a man who was engaged in lead, silver and copper smelting in Colorado. This man had been a pupil of Dr. Hunt and had gone west shortly after graduation and amassed a considerable fortune. I did not know a soul in Colorado, but I met some people in Denver, who gave me the following advice: "Go to the gentleman to whom you have the letter of introduction and present the letter, and if he tells you he has no position vacant, ask him if he will allow you to push a slag pot away from the furnaces." I went to Pueblo, the following day and presented my letter. It so happened that the night assayer had just resigned, so I was offered the position as night assayer of slags and refinery products at the magnificent sum of $50 per month, the work being 13 hours night shift for two weeks and 11 hours day shift for two weeks. I liked the work and it seemed to agree with me.

At the time of my entering the employ of the company known as the Pueblo Smelting and Refining company there were 13 technical graduates ahead of me. Shortly afterward the manager who had given me work resigned and a new man was put in charge. A little later the metallurgist was offered a good position in Australia, and he left. He was followed by the assistant metallurgist, and within a short time so many changes occurred in the technical force that I found myself assistant superintendent in the plant before I had been two years in the employ of the company.

Mine was rather an exceptional case. I was assistant superintendent only one year when the superintendent resigned and I was appointed superintendent of the lead department, there being another superintendent of the copper department. Shortly afterward, the superintendent of the copper department resigned and the manager asked me to take charge of both departments; at the same time telling me that the wages of the men in the copper department would have to be cut in half. This was a very pleasant opening, as you can imagine. I went to the foreman of the copper department, explaining my new position and the decision of the management regarding wages. The foreman told me politely that he and his men would quit, which they did.

Running Furnaces by a Book

I thereupon took some men from the lead department and put them in charge of the copper furnaces. I had never seen a charge of copper refined, but there was an article published in the "Transactions of the American Institute of Mining Engineers" by Dr. Eggleston, which described fully the operation of refining copper in the Lake country. I got this article and camped at the works without sleep for 56 hours, directing the men I had put in charge of the copper furnaces in every step of the process. Whenever I got stuck I would retire to the office and consult the article, the result being that we ladled the biggest charge of copper that had ever been taken out of the furnace, and that charge was of the best quality ever taken from that furnace.

After that things went smoothly enough in the copper department, as the men I had broken in took up their work readily, and as they were accustomed to furnace work it was not difficult to train them to handle copper.

I want to say, for the benefit of you young men, that the salaries paid in those days were not what are paid nowadays for similar services. My salary, as assistant superintendent, was $125 per month, and that large sum was only obtained after strenuous efforts on my part to have the management recognize my ability. That was the only time in my life that I ever asked for an increase in wages; but the manager, I knew, had no knowledge of the value of the services of a technical man; and I was aware that in other establishments in the vicinity men in my position were paid considerably more than I was.

I remained with the Pueblo Smelting and Refining company until 1897. At that time the Guggenheim family had a number of smelting establishments, one of which was in Pueblo. The late Benjamin Guggenheim (one of the Titanic heroes) asked me to enter the employ of M. Guggenheim's Sons and take charge, as manager, of their Philadelphia smelter at Pueblo—the idea being that as soon as I found a man to take my place I should be transferred East. The transfer was made about three months after entering the employ of these gentlemen, and I was placed in charge of the refineries at Perth Amboy, N. J.

During the next five years I was sent out to various parts of the country, including Mexico, and was for two years in South America, at Antofagasta, Chile, representing the interests of my employers.

After two years in South America, I returned to New York and shortly afterward my association with M. Guggenheim's Sons (who had, in the meantime, joined interests with the American Smelting & Refining Co.) was severed.

A few months later I was offered a position in Montana as superintendent of blast furnaces at the Washoe smelters, then just constructed. This position I took and a few months later, owing to the resignation of the manager, I was placed in charge of the plant and have remained there ever since.

Up from the Ranks

I will now give you, briefly, accounts of the lives of several men who are or have been prominent in the mining world. First, I recall a friend who was, at one time, employed by the Pueblo Smelting & Refining Co., in Colorado. This man was a graduate of Freiberg. He dropped into Pueblo one day without any acquaintance in the town; he applied for work at the smelter; was given a wheelbarrow and shovel and a position as laborer in the sampling mill. He did not mention the fact that he was a graduate of Freiberg, but it so happened that the furnaces were out of order and he dropped a hint to the foreman in charge as to a good way to bring the furnaces around. The foreman reported the

matter to the manager and the manager asked him if he knew anything about furnaces. He said he did "know a little," so the manager gave him a trial as an assistant about the furnaces. He proved that he did know his work and gradually he was advanced until he was placed in charge of the plant. Leaving that plant, later on, he took charge of a smelting plant in another part of Colorado, and he was then offered a position as metallurgist to the Broken Hill company, in Australia. This position he accepted with many misgivings, but it proved that it was the beginning of the making of his fortune. He built up the smelting industry for the Broken Hill company and then interested himself in other companies in Australia, finally retiring with a large fortune a few years ago. He still retains an interest in the work.

Another man took a small, humble position, with a placer-mining company in California, showed himself to be a good assayer; then later was put in charge of some small quartz properties; from there he was called to South Africa, at the time the Rand was coming into prominence; showed his ability as an organizer in organizing some of the big properties there and managing them, and is today one of the most highly paid consulting engineers in the world.

Another man, nearer home, worked for years as assayer in Anaconda, then in a similar position on the Pacific Coast, rising to the position of chief assayer at a large plant; then was offered a position as assistant to one of the managers in South Africa on the Rand, which he accepted. He filled that position satisfactorily and was advanced to the managership, and after several years' service in that capacity, returned to America to take up the work of consulting engineer, representing the capitalists who had been his employers on the Rand.

Another man, who began with pick and shovel around a smelter, gradually worked his way up to the superintendency of one of the large Colorado plants, was transferred to Butte, where he conducted some of the earlist experiments in the use of magnesite brick for the lining of converters; from there drifted into the mining end of the business, and is today one of the leading consulting mining and metallurgical engineers of the country.

Another man began as a field assistant to the geological survey of the United States; was afterward state geologist of Wyoming and from there drifted to Arizona, where he became connected with the Copper Queen Mining Co. His ability soon placed him at the head of the technical force of that company, and from that he was transferred to other larger concerns and given more authority, and today is the general manager of one of the largest companies in Mexico.

Another case: A young man sought employment at the Washoe smelter a few years ago as a laborer, said nothing about his technical knowledge, but put in a formal application for a position when a vacancy occurred in the technical staff. He was offered a position and we were surprised to find that he had been working for us for months as a laborer. He proved his ability in the technical line and when the opportunity was offered of a transfer to another company, at an increase of salary, he accepted, and today is the assistant superintendent of one of the largest companies in the country.

We have had many young men in Anaconda and in Butte who have worked their way up and today there are dozens of technical men employed about the mines and smelteries who are on the road to advancement.

The main things to be remembered by you are: To be not afraid to tackle any job that turns up. Never be above your position. Be sober and diligent. Faithful in business. True to your friends and to your employers. Learn to treat your associates and the men under you as men, and as soon as you can find the right girl (provided you have enough money to pay for the license), I advise you to get married. Do not wait to make your fortune before choosing your wife; if you do, the chances are 99 in 100 that you will never have one.

Mineral Output of New York in 1911

SPECIAL CORRESPONDENCE

The figures of mineral production by the New York mines and quarries during 1911, as compiled by the State Geologist, show a general falling off in these industries, the total value of the products amounting to $31,602,008, or about 10% under the total reported for the preceding year. The accompanying table gives the detailed statistics in practically final form, the items being ranged in order of descending value.

NEW YORK MINERAL OUTPUT, 1911

Product	Quantity
Brick, building, M.	1,078,019
Pottery and clay products	$4,291,441
Limestone and marble	$3,452,202
Iron ore, tons	1,066,148
Cement, bbl.	3,691,373
Salt, bbl.	10,082,656
Sand and sand-lime brick	$1,820,431
Natural gas, M. cu.ft.	5,127,571
Petroleum, bbl.	915,314
Gypsum, tons	446,794
Sandstone	$955,063
Trap	$899,414
Mineral waters, gal.	8,923,628
Talc, tons	65,000
Pyrite, tons	69,867
Granite	$148,633
Graphite, lb.	2,510,000
Garnet, tons	4,285
All else[1]	$464,582
	$31,602,008

[1]Includes apatite, carbon dioxide, diatomaceous earth, emery, feldspar, marl, millstones, pigments, slate and zinc ore.

Among the few industries which held their own or showed slight advances were those of portland cement, pottery, pyrite and talc; for graphite, gypsum and salt the declines were small; in iron ore and clay and stone structural materials, a decidedly downward tendency was manifest.

A product not hitherto recorded from this state was zinc ore, of which a few hundred tons were shipped from the deposits near Edwards, St. Lawrence County, for experimental purposes. The shipments consisted of lump ore, which averaged 40% or better. It is proposed in the future to concentrate the ore, as a mill for the purpose has just been erected at the mines.

Wet Concentration of Furnace Slags

By H. W. HARDINGE*

A recent professional call upon me again brought forward the fact that many things which have been tried in the past, if worked to an ultimate result, might end in success. This is evidenced in perhaps the most pronounced manner, in the case of the development of cyanide treatment of gold and silver ores. The wet concentration of slags, however, can hardly be compared with the cyanide process from a broad economic standpoint, owing to the limited quantity of material to be worked, but might be utilized in a lesser degree.

PRECIOUS METAL IN SLAG LARGELY FREE

My experiments made in 1895 and 1896 were recalled a short time ago by an inquiry from a large smelting works for the best means of crushing a complex mixture of slags, furnace bottoms and general smeltery accumulations. The question was asked "Would it be possible to gain anything by concentration of the above mentioned material?" referring only to the metallic particles contained in the mass. My answer was the production of assay records, which show recoveries of from 40 to 70% of the silver and from 50 to 120% of the gold by wet crushing and wet concentration of lead- and copper-furnace slags.

The obtaining of more gold in the concentrates than was contained in the original slag is, of course, impossible, but the concentrates would often show over 100% recovery of the assay. This is due to inaccuracies of the original assay to an extent of 0.01 to 0.02 oz., as the gold in the slag would show only 0.03 to 0.04 oz. This excess over 100% gold, could be easily reabsorbed in the assay slag as was the original gold in

*President, Hardinge Conical Mill Co., 50 Church St., New York.

the furnace slag. This gold and silver absorption in slags is absolutely known in all methods of assaying, and the excess gold values of the concentrate are thus readily accounted for.

In concentration there is no solvent absorption of the metals, as with slags, hence the precious metals follow the original particles of matte or prills of metal into the concentrates, and the high recovery would tend to prove the gold in slags is mostly metallic.

Before the above mentioned experiments were made it was a question with me as to the mode of occurrence of the metals in the slag, whether they were in the form of a material which could be separated by gravity, or as silicates, etc., which might even be lighter than some of the main constituents of the slag. My opinion was, that inasmuch as the metals concentrate, more or less, in the shell and in the bottom of a cooling pot of slag, gravity at least was the cause of these bottom concentrations. The metals also concentrate in some form of a quick transference from the center or molten portion of the slag pot to the side shell, where they were known to exist. Of course, it was fully understood that concentration of gold was partly attributable to particles of matte and prills of metal as occlusions in the slag, as well as in other lighter forms, the latter presumably predominating. Experiments proved, even beyond my expectation, that by wet concentration the metals were susceptible to accumulation as a concentrate.

Former Crushing Difficulties

The reason for not following these experiments to economic results was that the then best known method of crushing was by rolls. However, as I have always believed in experimenting even at some loss, for ultimate advancement, the then new feature of crushing by 42-in. diam., 6-in. face, high-speed rolls, was tried, and worked fairly well until the slag and matte cut the face of the rolls into small pits and corrugations, so that they were soon incapable of producing even a 20-mesh division at anywhere near the economic point between cost and result, when an 80- to 100-mesh material was desired.

We then made experiments with what was at that time known as the "Murphy barrel," being nothing more than a cylindrical tube or pebble mill in its earliest stages of development. The results obtained in the barrel were unexpected by me mainly on account of the fineness and the rapidity with which the work was performed. The concentration product of this pebble-mill material, when run over one of the first Wilfley concentrating tables ever made, was a surprise.

The possibilities of wet crushing a slag are far greater to-day with present improvements than they were at the time of my making these experiments about 15 years ago. The experiments were not further followed at the time mentioned owing to my skepticism as to how far and with what degree of economy pebble-mill crushing was possible, as well as a most active professional demand upon my time, but I always expected to return to the experiments so successfully started. Subsequent development of the pebble-mill shows that I was on the right track as to the absolute feasibility of wet crushing and wet concentrating a furnace slag. From the time of this experiment with the Murphy barrel I believe that I have been, professionally, one of the strongest advocates of the pebble-mill, which advocacy of the then apparently absurd idea of crushing, is now endorsed the world over, although at the time of the operation of this Murphy barrel I myself was sceptical of the statement that it would produce the results claimed for it. My assay records of several slag dumps show possibilities, not only of the one cited, but of others in Colorado, Arizona, Utah and Nevada. Blindly rushing to a conclusion that every slag dump will return satisfactory results will be fraught with disappointment, but the older slag dumps made during the earlier Western experiences in smelting, when only high-grade ores were treated, will justify reasonable investigation and experiments.

Phosphate Railroad Rates

The Interstate Commerce Commission has just handed down a decision in the case of Mayor and Council of Boston, Ga., *vs.* Atlantic Coast Line Ry. Co. *et al.* in which it orders a removal of discriminating rates on phosphate. The Commission holds as follows:

1. The record shows no substantial dissimilarity of circumstances and conditions affecting the transportation of freight to Boston, Ga., as compared with Quitman and Thomasville, Ga., both rail and water competition appearing to be practically the same at the three places, and the charging of a differential higher than the Quitman or Thomasville rate on all traffic to Boston from New York and from Ohio River crossings, on phosphate from Montgomery, Ala., is unduly prejudicial to Boston and unduly preferential to Quitman and Thomasville. Carriers ordered to remove the discrimination.

It is also held that the financial inability of defendants to extend to Boston the Thomasville-Quitman rates, even if this could be established as a fact, is no answer to the charge of favoritism.

The Survey's Work on Potash

Washington Correspondence

Director Smith has filed with the House of Representatives a statement relative to the work of the Geological Survey apropos of the pending appropriations, in which he affords some new information concerning various phases of its work. In this he states with reference to the potash inquiries:

We have reported on deposits of potash minerals in Utah and Colorado, and, on the extent of certain potash-bearing rocks, in which potash is in a more readily available form than it is in granite, from the hills in Wyoming. The reports on these have been published and distributed.

In most of these cases the question of making potash available commercially having been already under consideration by private parties, we considered the function of the Geological Survey not to investigate processes but to give authoritative information to the public as to the extent of these supplies. In the case of alunite, the extent was not as great as was believed by some people in Utah and New York. Information regarding similar deposits in Colorado was also published. Then, we have published information on the percentage of potash in some of the bitterns, which are, you might say, noncommercial brines associated with salt brines, in the East. They are the underlying liquors that are not available for making common salt. In one case in Ohio it was shown that these brines carry a considerable portion of potash. We simply point out the facts, and we think it is for individual and corporate initiative to pursue the problem.

We would like to continue the drilling. If we do not find potash at the Carson Sink we will be glad of an opportunity to use the equipment, which has already been purchased under this appropriation, in another basin where the geological conditions are such as, in our opinion, to favor the concentration of potash salts beneath the surface. Of course, the piece of work that might be considered as yielding the best result was accomplished by one of our geologists, together with one of the field men from the Agricultural Department, in southern California, down near Death Valley, where they proved the presence of potash. This had been discovered at a lake which is underlaid with a body of at least 90 ft. of impure salt, and the liquor which saturates that body contains as high as 44% of salts, and about 7% of these salts is potash.

The question of commercial value resolves itself, I think, into a transportation problem. The salts appear to be in such condition, in this solution, as to facilitate the concentration of the potash, and that can be done probably by using windmills for power for pumping and simply using solar evaporation, because that is in as hot a country as we have. It is within 20 miles, I believe, of a new railroad, and the question becomes one of transportation. My own opinion is that it will afford a supply of potash that will be available for that western country, at least until the canal is completed. I do not see how it can compete on the Atlantic coast with the German product, because you un-

derstand, the German product already has a wide margin of profit, so they can cut prices considerably. But even if it only resulted in lowering the price of the German product to the consumers in the central part of the country it would accomplish a good purpose. The amount expended, I think, by the two departments is insignificant when compared with the result that has been accomplished, and I am anxious to continue drilling on a somewhat more extended scale, although that wil not involve the purchase of any more equipment.

Iron River District, Michigan

NEGAUNEE CORRESPONDENCE

Interest is manifested in Michigan over the report of developments in the Iron River district, from the advance sheets on the "Mineral Resources of Michigan," by R. C. Allen, state geologist. The report says:

The development work of the last few years has shown three important and striking facts bearing on the future of the district: (1) The ore-bearing formation is exceedingly rich, i.e., the ratio of the volume of known ore to known iron formation is relatively high. (2) Ore reserves have already mounted to a high figure, and (3) probably only a small part of the producing area has been explored. The Iron River district has one of the great ore reserves of the state if not actually the largest. The following table is taken from the report of J. R. Finlay to the State Tax Commission in 1911.

TONNAGE ESTIMATED BY J. R. FINLAY

Mine	Tons of Iron Ore Reported in Sight	Total Tonnage Expected
Osana (James)	520,000	2,000,000
Chatham	43,000	100,000
Hiawatha	254,993	1,000,000
Baker & Tully	3,500,000	3,500,000
Dober (Riverton)	713,000	1,700,000
Baltic-Fogarty	460,000	3,000,000
Caspian	3,505,500	10,000,000
Youngs	250,000	1,000,000
Zimmerman	1,000,000	1,000,000
Berkshire	563,000	1,000,000
Davidson	2,000,000	2,000,000
Wauseca (Konwinski)	40,000	1,000,000
Chicagon	390,305	600,000
Michaels Expl	1,000,000	1,000,000
Blair Expl	372,259	1,400,000
Houlihan	578,000	5,000,000
Rogers	349,306	2,500,000
Donahue	371,437	800,000
McGovern	258,413	350,000
Bates	.....	400,000
Wickwire	.....	40,000
Erickson	.....	732,000
N. Y. State Steel	.....	2,000,000
Totals	10,169,213	42,122,000

The above estimates bring out the striking fact that this district has an expected tonnage in mines and explorations of seven times the total shipments, and furthermore, that 15,882,000 tons or over 37% of the reserve is in properties which had not reached the producing stage before 1911. Notwithstanding the difficulties inherent in prospecting a drift-covered field, the Iron River district offers in the proved richness of the ore-bearing formation and the successful outcome of the many recent operations, one of the most attractive areas for exploration in the Lake Superior region.

Regarding the hypothetical connection of the Iron River district with the Gogebic Range to the west, the report says:

Further work planned for the season of 1912 will throw more light on the structural conditions here discussed, but enough is already known to demonstrate that there is no direct connection between the Gogebic and Iron River districts. The iron-bearing series of the latter, if continuous westward, which is considered practically certain, passes south of the Archean mass which limits the Gogebic district on the south.

South African Notes

JOHANNESBURG CORRESPONDENCE

The Victoria Falls & Transvaal Power Co. has apparently overcome most of the earlier difficulties met with in the transformers and transmission line, and is now supplying power to the satisfaction of its customers. Its subsidiary, the Rand Mines Supply Co., has orders for 67,000 electrical horsepower and 66,000 hp. in compressed air, while the parent company has orders for 52,000 hp., making a total of 185,000 hp. to be supplied. Of this, provision has already been made to supply 132,000 hp. The company is creating £2,000,000 debentures and issuing half of this bearing 5½% interest, in order to provide the additional horsepower required. The February profit was £37,000, and an annual profit of £670,000 is anticipated.

In the JOURNAL, Apr. 13, 1912, it is stated that 60,000 hp. is to be obtained from the Victoria Falls, in Rhodesia. Nothing is publicly known locally of any such project, and as electrical power generated locally or near Johannesburg from coal can be produced for about 0.3d. per unit, it is quite improbable that this project, which was the earliest one considered, will be revived, even if the Transvaal government would allow it to be carried on.

NATIVE-LABOR SHORTAGE

Owing to the shortage of native labor in recent years, a peculiar position has grown up among the mining houses of the Rand. Long ago they united to form the Witwatersrand native-labor association, which controlled recruiting on a co-operative basis all over South Africa. It was afterward agreed that the groups interested should also recruit for themselves in certain parts of the Union of South Africa, though the Witwatersrand association controls the chief source of supply in Portuguese East Africa. The curious position then arose of the mining houses keeping separate recruiting agencies and encouraging private recruiters to compete fiercely among themselves and with the Witwatersrand native-labor association. As a result, about three-quarters of a million pounds were spent last year in useless competition, with the inevitable effect of a great rise in native wages and in recruiting costs per ton mined. The houses are now endeavoring to arrange matters on an equitable basis and to unite again.

The trouble has arisen owing to the fact that some mines are much more popular with the natives than others, especially some rich outcrop mines, and these have always been able by a little private effort, to secure abundance of labor at the expense of the others less fortunate. In some mines, natives are still compelled to climb in and out from great depths. In the Randfontein mines, the natives have to climb 1800 to 2000 ft. Needless to say, this is a terrible tax on endurance and tends to a great decrease in efficiency.

At the recent meeting of the Central Mining & Investment Co., the chairman foreshadowed further amalgamations among the mines, and also hinted at amalgamations among the controlling houses.

SAND FILLING AT SIMMER & JACK

At the Simmer & Jack mine, another borehole, 7 in. in diameter, is being sunk for the purpose of sand filling. It is intended to pass all the sand from the 320-stamp mill underground for filling purposes. This is becoming necessary for reclaiming pillars, etc., as the mine is nearing the end of its life; the ore reserves are being encroached upon to the extent of about 400,000 tons per year, and little development remains to be done.

Great stress is now laid on good classification, so that sand free from slime is sent below. This sand drains much better in the stopes behind the barriers. The sand pulp is thickened in diaphragm cones on the surface. The Hendryx agitator and Hardinge mill are at present under trial by the Mines Trials Committee on the Rand.

The profit declared by the Cape Copper Co. for last year is the smallest on record, owing to the exhaustion of the Ookeip and Narrap mines, near Port Nolloth, at the northwest corner of Cape Colony. Boring is proceeding in depth below both orebodies, and the Narrap bore recently entered a body of low-grade ore. The company has, however, acquired a mine in India, which may make that country a contributor to the world's copper output. Exploration over a mile of strike has shown the existence of 5 to 6% copper ore; 60,000 tons are fully developed and 50,000 tons are partially exposed to date.

The ore reserves at the Shamva mine, in Rhodesia, are now stated to be 1,808,000 tons, with a value between 7.2 and 4.6 dwt. per ton. The former figure was arrived at by not reducing the high assays encountered.

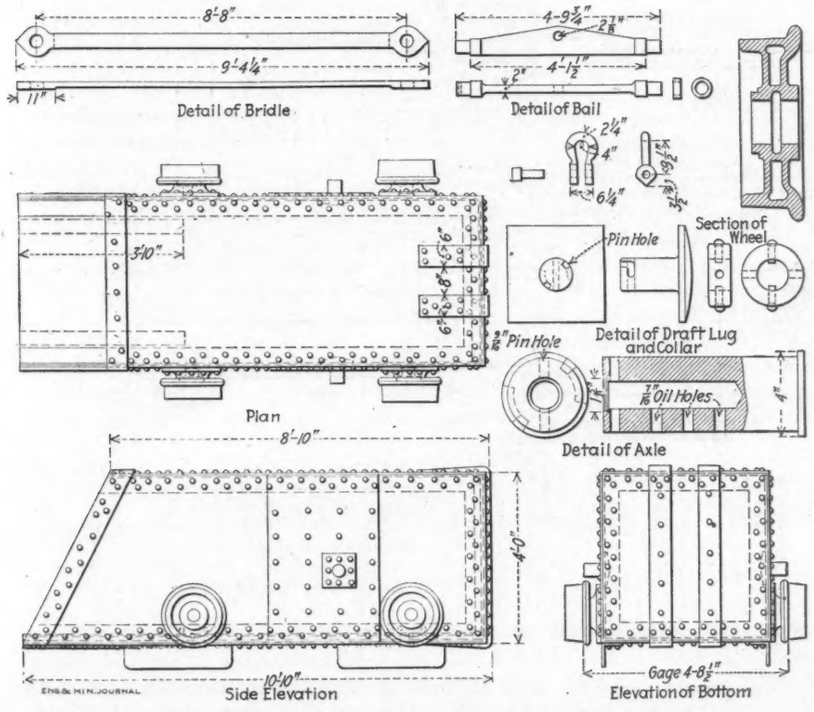
A blueprint map, which is later to be photolithographed, has just been issued by the Bureau of Economic Geology of the University of Texas, showing the iron-ore deposits, operating lignite mines, blast furnaces and producing oil fields of Eastern Texas.

Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

Copper Range Ore Skip

The 6-ton skips used in the Copper Range mines in the Lake Superior copper country, present several novel details of construction, especially in the manner of attaching the draft lugs to the body of the skip, the system of oiling the wheels, and attaching the collars to the different lugs, bails and wheels. All hubs on which collars are used, are drilled for a split pin which holds the collars in place. The hubs are also cut with slots at 45° that receive the rivet pins of the collar.



DETAILS OF THE SKIP USED AT THE CHAMPION MINE

In the accompanying illustration of the skip the details of the draft lug and the collar used with it are shown. Projecting from the inside surface of the collar and at 90° frem the hole drilled to receive the split pin, are two pins riveted into holes in the collar. In assembling the collar on the lug, the pins are slid into the notches to the bottom and then the collar is turned through an arc of 45°. This causes the pins to enter the grooves and when they are against the ends of the two grooves, the holes for the split pins in the collar are in line with the holes in the axle and the split pins may be forced through. In this way the collar is held at four points instead of at two, so that it is held on much more securely than ordinarily is the case. This security is desirable because a piece of rock may get in between bridle strap and the side of the skip and during hoisting the pins holding the collars in place may be subject to a strong shearing stress. All of the other collars are attached in a similar way.

The body of the skip is reinforced at the lugs by an extra plate. The bridle strap is bent so as to clear the front wheel. In order to keep the skip as low on the rails as possible, the wheels are mounted on hubs riveted to the sides instead of on axles. At the bottom there are two reinforcing straps, while on the under side and at the front end there are two straps that take the wear that comes on the skip's bottom when going over the roller of the dumps. By attaching the draft pins by lugs riveted to the body or the inside of the skip, the lugs are fastened much more securely than if riveted to the outside, as is the usual way.

The method of oiling the wheels is shown in the drawing of the axle. The ends are hollow and three holes in the walls let the grease out to the wheels. The wheels are made with a receptacle in them that also becomes filled with grease and acts as a reservoir, as can be seen by reference to the accompanying drawing of the wheel, there being four holes drilled through the brass bushing to connect with the reservoir. These grease cavities are closed by a screw plug that cannot be taken out without removing the collar from the axle. The grease is shot into the wheels by a plunger gun that screws into the axle so that grease can be forced into the hole so as to fill the cavity. Formerly when the wheels of the skip were filled with oil and the oiling of the axles was done by oil feeding down on them from these reservoirs, the wheels had to be filled four times per day, while the grease well has to be filled only once in 48 hours.

The rope is attached around a thimble. This thimble is now made solid instead of having its sides cut away and only reinforcing ribs going across, as they were formerly made; that construction proved to be too weak. The manner of attaching the lugs and collars, as well as the methods of oiling without the necessity of takoff the collars, was devised by W. J. Richards, the master mechanic of the Copper Range Consolidated Company.

Ore Crushing Plant Underground

A crushing and screening plant is being installed underground in the Round Mountain mine, at Round Mountain, Nev. It will be placed on the 450-ft. level, and will be similar to a plant already installed in the "Stringer Section." As mined, the ore contains many large boulders of rock, which itself is barren, but may envelop pieces of ore. In order to save this ore it is necessary to crush the boulders and sort the crushed material.

The plant will comprise a 12x20-in. jaw crusher, and an 18-in. belt conveyor to carry the crushed material to a trommel 10 ft. long by 40 in. diameter, which will be set above loading pockets cut out of the rock above the level. The fine material will be trammed to the shaft, hoisted and sent to the mill. The waste, or coarse material, will be hauled by mules, through a tunnel, to daylight.

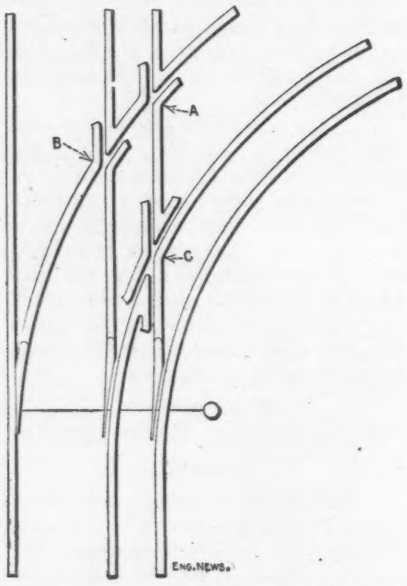
According to the last annual report of the Round Mountain Mining Co., the crusher installation will effect great economies in handling and sorting the material mined. A better grade of ore will be produced, as under these new condi-

tions about 66% of the gross tonnage mined will be rejected as waste whereas during the last year 54% was rejected. It will also increase the total recovery of precious metals as it will be possible to send to the mill the greater part of the ore contained in the boulders, which heretofore has been rejected with the waste.

A Double Gage Turnout

The turnout shown in the accompanying illustration is used, states Frederick MacCoy (*Eng. News,* Jan. 25, 1912), wherever 36-in. and 4 ft. 8½-in. tracks are used together in Mexico.

This turnout is used at the Esperanza mine in the El Oro district, in the state of Mexico. The gage of the mine tracks is 36 in., while that of the main railroad line is of the standard gage of 4 ft. 8½ in. A motor car runs on the narrow-gage tracks, drawing either narrow- or standard-gage cars. One lever is used to operate both switches. Frogs *A* and *B* are standard while *C* is a crossing frog.



DOUBLE-GAGE TURNOUT USED ON MINE TRACKS

Repairing Cast-Iron Tanks

A cement for repairing cast-iron tanks is prepared by melting at a low heat—to prevent the brimstone catching fire—five parts of sulphur, two parts of black lead and two parts of sifted cast-iron filings. Before applying the cement, states the *Engineer and Fireman,* warm the metal by laying a red-hot iron over it. The metal must be perfectly dry, so as not to generate steam. Then stop up the damaged part with the cement, applied in a soft state by gently heating it in an iron ladle.

Conservation of Water in Placer Prospecting

BY S. O. ANDROS*

In the desert country it may often happen that in making a preliminary examination of placer ground, the problem of obtaining water sufficient for rocking the dirt from the prospect holes is a serious one. I have often had occasion to put down a series of prospect holes across a channel where the available water has been three, four, and sometimes six miles distant. While the outfit will, of course, include a wagon, the party can usually be lessened by one man if the teamster is not continually employed in hauling water. With the usual method of handling dirt from a dry hole sunk by hand, it will require from four to six barrels of water per day, the larger amount being necessary only when the surface material is a loose sand. This amount of water can be reduced somewhat by using the rocker shown in Fig. 1, and the degree of accuracy in determining the value of the deposit can be increased greatly.

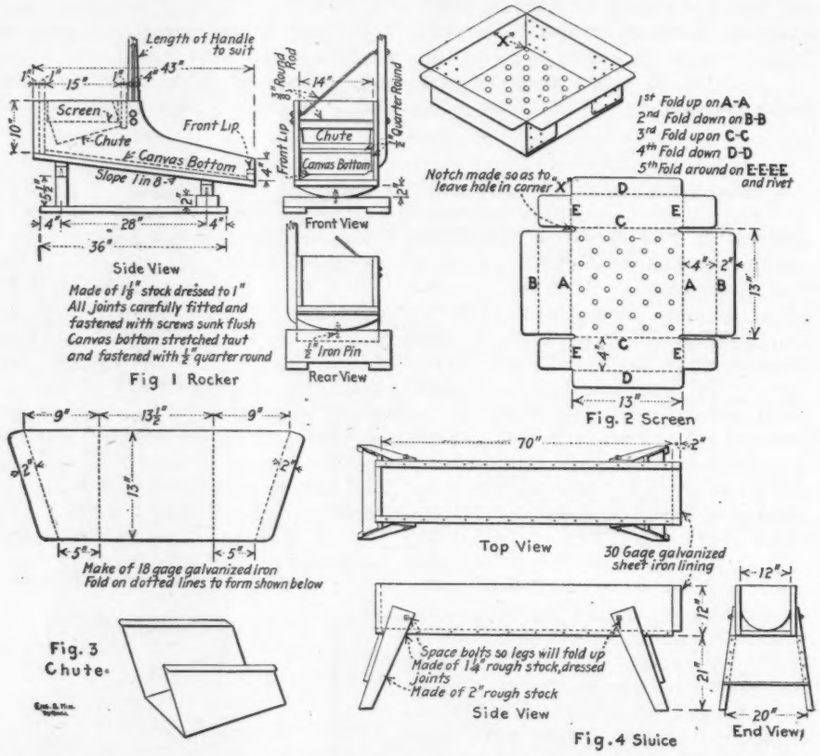
The ordinary California rocker made of rough lumber fastened with nails, becomes in two or three days a rickety affair not conducive to accuracy and wasteful of water. Where the accuracy of determination of metal content is the prime factor, the five or six dollars increased cost of a rocker that will develop no cracks is unimportant.

ROCKER SPECIALLY DESIGNED

The rocker shown in Fig. 1, devised in 1905 by R. G. Coates and me, and used successfully by us since that time, will cost between $15 and $25, depending on the section of the country in which it is built. The canvas stretched over the bottom of the rocker eliminates the possibility of any colors becoming lodged in the cracks between the boards. Eight-ounce duck is sufficiently heavy for this purpose. A priming coat and two coats of paint will further add to the certainty of saving all the colors the dirt carries. I use riffles of dressed stock ½-in. square, spaced 9 in. apart along the bottom of the rocker. It is well understood that the dimensions as given in the cut are elastic and will be varied to suit conditions. The dimensions as given are well adapted to a free-washing gravel.

The screen in Fig. 2 should be made of galvanized iron of a weight adapted to the size of the boulders, varying from 18 gage for small pebbles of 1-in. diameter to 10 gage for boulders of 4 to 5 in. in diameter. The chute in Fig. 3 need never be heavier than 18 gage.

The sluice box shown in Fig. 4 is intended primarily, and was first used, for prospecting by sinking drill holes. The attached folding legs are more convenient than the use of separate horses and the space on the wagon occupied


Length of Handle to suit
Screen
Chute
Front Lip
Canvas Bottom
Slope 1 in 8
Side View
Front View
Rear View
Made of 1⅛" stock dressed to 1"
All joints carefully fitted and fastened with screws sunk flush
Canvas bottom stretched taut and fastened with ½" quarter round
½ Iron Pin
Fig 1 Rocker
1st Fold up on A-A
2nd Fold down on B-B
3rd Fold up on C-C
4th Fold down D-D
5th Fold around on E-E-E-E and rivet
Notch made so as to leave hole in corner
Fig. 2 Screen
Make of 18 gage galvanized iron
Fold on dotted lines to form shown below
Fig. 3 Chute
Top View
30 Gage galvanized sheet iron lining
Space bolts so legs will fold up
Made of 1¼" rough stock, dressed joints
Made of 2" rough stock
Side View
End View
Fig. 4 Sluice

CONSTRUCTION DETAILS OF A ROCKER FOR USE IN PLACER PROSPECTING

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by the horses when moving from one place to another can be used otherwise to good advantage. A shutter of ¾-in. stock cut to fit the open end of the sluice and covered with felt will retain perfectly a thin pulp. I have found that the use of the sluice box for softening gravel slightly cemented saves time in rocking and its use makes the rockerman's labor easier.

Whenever the water supply has been small or the water distant from the prospect holes, I have used a conserving box. The box is made of 1x12 rough lumber and its dimensions are: Length, 6 ft.; width, 4 ft.; height, 12 in. The box can be knocked down for transportation. The rocker with its base is placed in the box, which is filled with water. Rocking is then begun and at the end of 30 minutes the puddling is so complete that the box shows no leakage. The water in the conserving box can be used during an entire day's run. Where four barrels of water per day are necessary with the usual ground pool and its return channels, one barrel of water every other day will be found a sufficient quantity when the conserving box is used. It will be found advisable to shovel out the tailings as seldom as possible, since each shoveling slimes the water to a great extent.

Repairing a Cracked Pump Cylinder

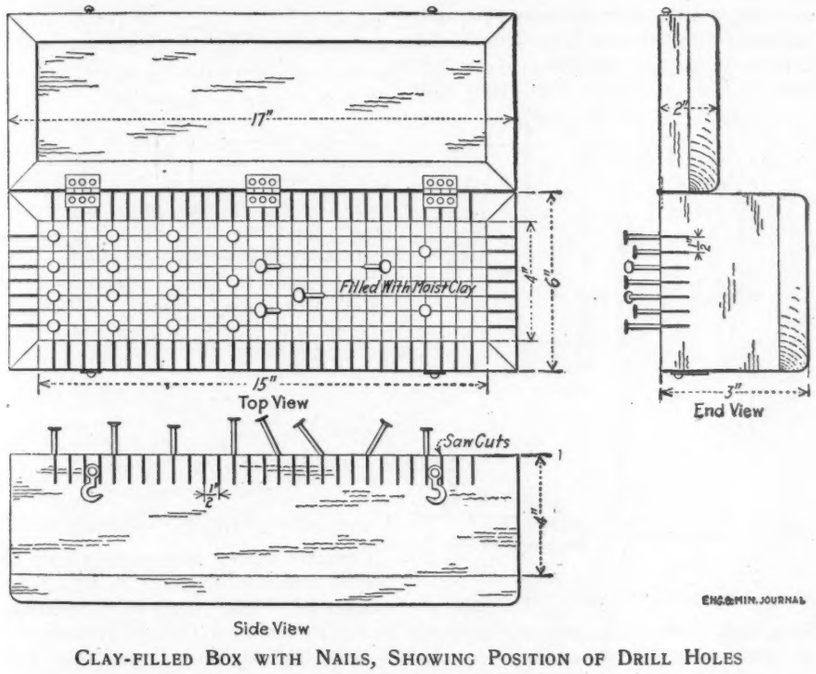
A cracked pump cylinder was repaired, states F. H. Coleman, in *Power*, by drilling a hole at one end of the crack and tapping for a ⅜-in. plug. Another hole was then drilled close to the first, the drill extending into the first plug about ⅛ in. The second hole was then tapped and plugged, and the method continued until the crack was covered. It was then smoothed off with a file and calked. Straps ⅜ in. thick used with iron cement further secured the job.

The pump has been running for some time with a 110-lb. pressure without signs of leaking.

Prevention of Drilling into Misfired Holes

By John T. Fuller*

A common cause of accident in shaft sinking is drilling into a misfired hole or striking a pick into a misfire while mucking. Such accidents are due frequently to lack of information as to the exact situation of the holes of the blasted round.



Clay-filled Box with Nails, Showing Position of Drill Holes

There are several ways of lessening the danger. One is to have the succeeding shift charge and blast the holes drilled by the preceding shift. This second shift then mucks out and drills the holes for the next shift to blast. A second way is to have each shift drill, blast and muck its own round, leaving the shaft clean for the next shift.

Both of these methods, however, involve more or less of an upset of the usual order of doing things, which, in these days of labor unions and labor troubles is, to say the least, not appreciated. The usual order is to have the shift coming on muck the rock broken by the preceding shift, then drill and blast a round of holes, leaving the muck in turn for the succeeding shift.

In a large shaft, sunk under my direction, the device herein described was used to aid in locating the holes drilled by the previous shift. A box was made of the same shape as the shaft and built to a convenient scale, as shown in the accompanying sketch. It was about 4 in. deep, and along the edges saw cuts about 1 in. deep were made, the distance between each representing 1 ft. of length or width of shaft. A substantial cover with hooks to fasten it securely shut was also provided. This box was filled with moist clay, leveled off even with the edges and lines scribed across the surface of the clay by a pocket knife and a straight-edge, using the saw cuts as guides.

The box of clay thus represented the shaft bottom, subdivided into 1-ft. squares. When the miner went down to charge the holes he carried this box with him; also a pocketful of 20-d. wire nails. Before charging a hole, he would thrust his tamping stick to the bottom, which enabled him to gage the direction of the hole. He would then thrust a wire nail into his clay model as closely as possible to the direction and position of the hole in the shaft bottom. The squares greatly aided properly locating the holes in the model. Thus, when the miner had completed charging and had lighted the round, he returned to the surface with an almost exact reproduction of the layout of holes.

The box, with its record, was turned over to the miner in charge of the succeeding shift, with such other information as could be gathered from listening for, and counting the reports, etc. When the men went down to muck out after the smoke had cleared, they took the box with them, using it as a guide in directing the mucking and in locating any possible misfires after the shaft had been cleaned out and before work was started on the new round of holes. It was then a simple matter to withdraw the nails, smooth over the clay and prepare the box for the next record. Not a single accident due to drilling or mucking into misfired holes occurred in this shaft, although it was about 30x8 ft. and was sunk to the 1000-ft. level.

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Pulmotor at a Lead Mine

By Claude T. Rice

A Dräger pulmotor is kept at hand at the mines of the St. Louis Smelting & Refining Co., in the lead district of southeastern Missouri, although at those mines little trouble from gas and fire is to be expected. However, hoisting and hauling in the mines are done by electricity, consequently there is a possibility that somebody may receive an electric shock. The pulmotor is one of the few devices that seem to be of real assistance in case of such accident. Moreover, it is also dependable in restoring a person overcome by gas. It is simply an artificial

respirator that rhythmically pumps dilute oxygen into the lungs, inflating and contracting them in a natural manner without any roughness or movement of the limbs of the body as in ordinary systems of inducing respiration. The device has been thoroughly tested and is now used by all the first-aid corps at coal mines. The cost of a pulmotor is not high considering its efficacy in case of accident.

The Dräger or some other form of helmet for fire-fighting is being provided at several metal mines where much timber is used underground. Now that electricity is being used so extensively in and about mines and mills, and often at high potential, it should also become customary for mining companies to provide some device such as the pulmotor for aiding in restoration of employees overcome by electric shock. It should be remembered that because of the damp condition of miners' clothes and mine workings, shocks at voltages that cause little trouble on surface often are serious when received underground.

Remarks on Hoisting Ropes

The latest Prussian statistics on shaft hoisting ropes are exhaustively and critically discussed by Professor Herbst, of Aix-La-Chapelle, in a series of articles in *Glückauf*. The general conclusions arrived at, states the *South African Mining Journal*, are of special interest and are as follows:

The protective effect of lubrication has not been plainly proved in dry shafts. This observation suggests the conclusion that the present lubrication processes for wet ropes leave room for improvement, although it is certain that all now-known lubricative agents rapidly disintegrate in shafts where the water is salty or sour. Future experiments in this direction may provide a remedy.

Galvanizing or coating with zinc does not appear to have a really protective effect in wet shafts, the reason probably being that zinc coating has but little power of resistance to salt water. It is also suggested that the wires have suffered in the galvanizing process, for, although it has been proved by Winter and others that the process, when properly and carefully executed, does not unfavorably affect the ropes, it is also well known that it often reduces the tensile strength of the rope by 50% or more.

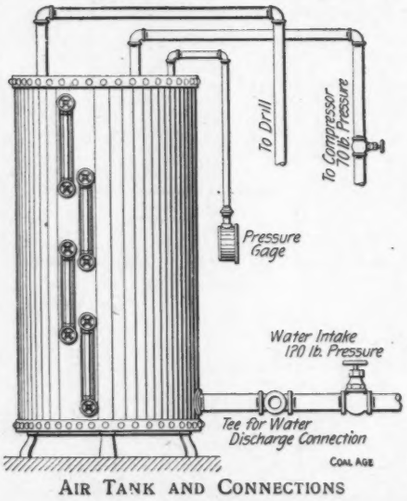
The hauling efficiency of ropes in dry shafts stands in the proportion of 100 to 60 or 70 to that in wet shafts, a fact which, in view of the high price of ropes, means a substantial economic advantage for dry shafts.

Tensile strength between 160 and 180 kg. per sq.mm. does not unfavorably affect the flexibility or hauling strength of the ropes, while ropes of more than 180 kg. per sq.mm. have given substantially lower efficiency figures.

The greater or less strain, as expressed by a higher or lower safety factor, put upon ropes has had no influence upon their consistency. It may, therefore, be assumed that the advantages of a higher factor of safety are neutralized by its disadvantages, that is, greater rope thickness combined with reduced flexibility and greater dead weight.

Testing Air Consumption of Drills

The apparatus herein described has been satisfactorily used in testing the air consumed by rock drills. As shown in the accompanying illustration, a vertical air receiver is connected to the compressor line by a 1-in. pipe, fitted with a globe valve, and a 1-in. outlet pipe is led from the receiver to the drill. Water gages are placed one above the other throughout the entire height of the receiver, and a pressure gage is supplied. At the bottom of the receiver a 3-in. pipe with



AIR TANK AND CONNECTIONS

globe valve furnishes water, and between the receiver and intake valve a tee connection is provided as a discharge.

Before starting the test, water is allowed to flow into the receiver until it is just visible in the lower gage, and a chalk mark is made opposite this level. The receiver is then filled with air at the desired pressure, the air shut off and the test begun. As the drill takes air from the receiver, the operator maintains a constant pressure by regulating the water valve. Simultaneously with the stopping of the machine a chalk mark is made at the water level then shown by the gage and the water drained off in preparation for the next test.

The distance between chalk marks, depth of hole drilled and time of drilling are noted. The cross-section of the tank being known, the distance between the chalk marks makes it possible to find the volume of air used, at the given pressure, and from these figures the amount of free air can be computed.

It may happen, states *Coal Age*, that in spite of the control provided by the water supply, the air pressure will decrease during a test. In this event, the amount of free air used may be calculated as follows:

Let

P = Initial pressure,
P_1 = Final pressure,
B = Height above initial water level to top of receiver,
A = Cross-sectional area of receiver in sq.ft.,
R = Rise of water in receiver, in ft.,
H = Atmospheric pressure.

Then each foot rise of water in the tank, represents the consumption of A cu.ft. of air and if the pressure had remained constant at P, the volume of free air used would have been given by

$$V = RA \times \frac{P+H}{H}$$

However, the expansion of the air that remains in the receiver, from pressure P to P_1, represents the consumption of a volume of free air equal to

$$V_1 = A\,(B-R)\left(\frac{P+H}{H} - \frac{P_1+H}{H}\right)$$

and the total amount of free air used is then $V + V_1$. It may prove to be simpler to let V represent the initial amount of free air in the tank at pressure P and V_1 represent the final amount of free air at pressure P_1. Then

$$V = AB\frac{P+H}{H}$$

$$V_1 = A\,(B-R)\frac{P_1+H}{H}$$

and $V - V_1$ will give the amount of free air consumed during the test.

Concrete Survey Monuments

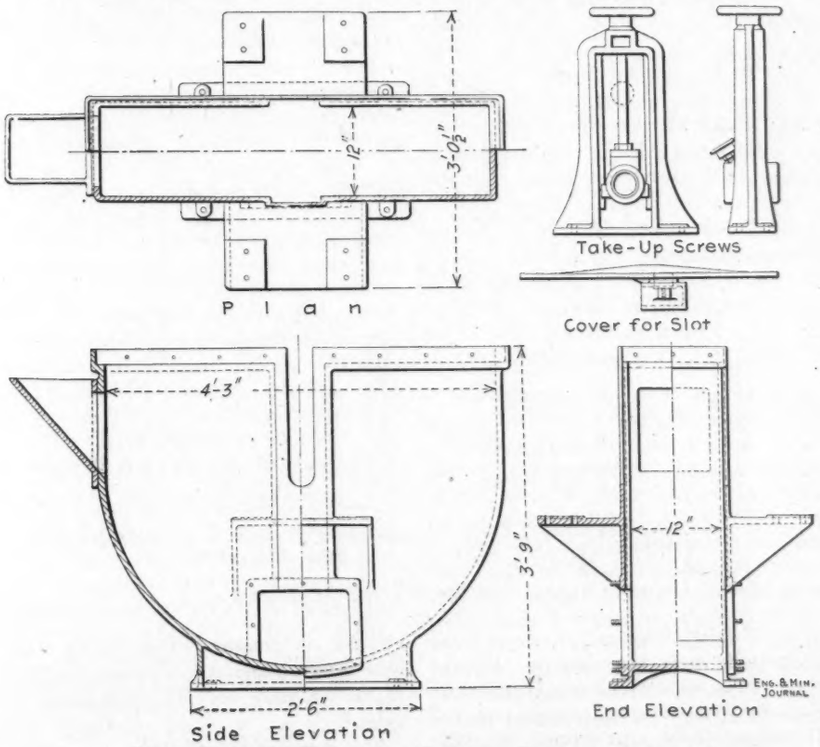
Concrete survey posts for marking the township and section corners in a forest reserve of 475,000 acres have been suggested by the U. S. Geological Survey. It is said that satisfactory concrete posts have been made in conical forms of thin sheet iron, with locked joints like a stove pipe. To give these sufficient strength while the concrete is rammed into place, they are bound with several rings of heavy wire. As these forms cost only a few cents each, one can be provided for each corner and left in place, and will aid in protecting the cement from drying too rapidly. A 12-in. hole, three feet deep, dug with a post-hole digger, is filled nearly to the top with cement and broken stone. The conical form is then placed on top of the soft concrete base, filled with cement and well tamped. A tablet is forced into the cement through the open top of the form. Heavy wire (plain, galvanized or barbed) for reinforcing the posts will add considerably to their durability. If reinforced a top diameter of four inches, increasing to about six inches at the ground surface, will, states *Engineering News*, probably give sufficient strength.

Details of Metallurgical Practice

Records of Experience in Ore Dressing, Cyaniding and Smelting

A Steel Elevator Boot

A steel elevator boot with the pulley take-up screws supported by shelves on the outer sides is used in the No. 3 mill of the Doe Run Lead Co., near Rivermine, Mo. The boot was designed, as illustrated in the accompanying drawing, by H. R. Wahl, mechanical engineer for the company, and is used on elevators raising dry or wet material. The boot of a wet elevator must be considerably wider than the boot of a dry elevator, although a 10-in. belt is used in each.



STEEL ELEVATOR BOOT WITH OUTSIDE TAKE-UP BEARINGS

The ends of the shaft of the lower pulley pass out of the sides of the boot to the adjustable bearings supported on the shelves through slots which are closed by slides that can be fastened in place by setscrews after the adjustment has been made.

Openings are provided at bottom of the boot through which the material within can be cleaned out in case of shutdown. The feed hopper is used only on elevators raising wet material. The hopper opening can be closed with a cast-iron plate if the boot is to be used on an elevator raising dry material, as no hopper is necessary. Rubber gaskets are used in all the joints of a boot for a wet elevator. The boot is attached to the housing by four bolts so that it may be easily opened if necessary.

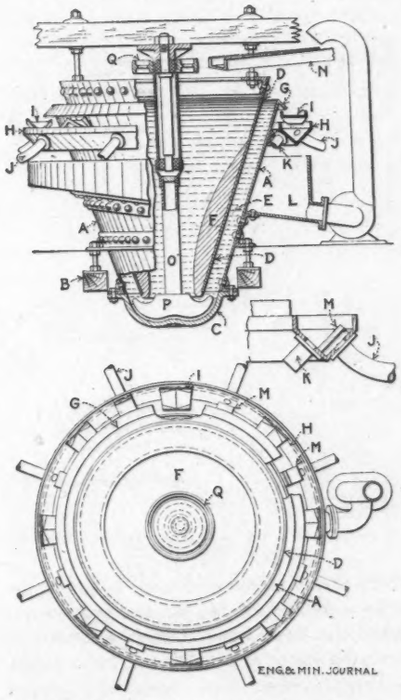
Stroke Counter for Compressors

At the power plant of the St. Louis Smelting & Refining Co., in southeastern Missouri, the stroke counters on the air compressors are connected with the low-pressure air cylinders. This allows the placing of the counter with the other indicators on the main gage-board of the engine.

A ¼-in. pipe is tapped into the low-pressure air cylinder and is carried over to a small cylinder on the main gage-board. The piston of this cylinder rises and falls with the pressure in the main cylinder, and the counter is in turn operated by the movement of the piston in the auxiliary cylinder. This enables the assembling of all indicators in a handy, practical manner on the main gage-board and enables easier watch to be kept of everything in connection with the work being done by the engine.

A New Pulp Distributor

The apparatus illustrated in the accompanying drawing has been patented (U. S. pat. 1,020,251) by H. C. Behr and C. F. Schmitt, of the Consolidated Gold Fields of South Africa, Ltd., and was designed for subdividing a stream of pulp for supplying a number of tube mills or concentrators with an individual feed of the same character as regards dilution and composition as the original stream of pulp. The apparatus may also be used for sampling pulp or as a measuring device for pulp or water.



A CONE-TYPE PULP DISTRIBUTOR

The device consists of an outer cone *A*, bolted to standards *B*, and closed at the apex by a cap *C*. Within the cone *A* a second cone *D*, open at the apex, is suspended from overhead supports, so as to leave an annular chamber *E* between the two cones. The width of this chamber can be varied by raising or lowering the inner cone by the adjustable bolts, by which it is suspended.

The inner face of the cone *D* is contracted by the filling *F*. The outer cone is equipped with an overflow lip *G*, by which the pulp is discharged into the circular trough *H* that encircles the rim of the outer cone and which is divided into

a number of compartments corresponding to the maximum number of streams, into which the main stream is to be divided. From the bottom of each of these compartments two discharge pipes *J* and *K* lead, *J* to an attached pipe that conveys the pulp discharged into the corresponding compartment to a tube mill or concentrator, while *K* discharges into a launder *L* that encircles the outer cone of the distributor. A flap valve *M* can be thrown to close either of these discharge pipes.

The main stream of pulp is delivered to the chamber within the inner cone through the launder *N*. The pulp flows downward in the inner cone, thence rises through the annular chamber, between the inner and outer cones, overflowing as a homogeneous mixture into the trough *H*. Any pulp discharged into the launder *L* flows to a pump by which it is raised back into the feed launder *N*. In case that there is any tendency for the solids in the pulp to settle and clog the discharge opening of the inner cone, a stirring device *O*, carrying vanes *P* and driven by the pulley *Q*, is provided. The horizontal driving pulley is driven by a quarter-turn belt from any convenient shaft near the distributor. The device prevents the coarse grains from settling in a compact mass and clogging the device.

If it be desired to shut off the stream of pulp to any tube mill or concentrator, the flap valve *M* of the compartment in the trough *H* corresponding to the feed of that machine is thrown over so as to close the discharge pipe *J* and open the discharge *K*; then the portion of the pulp received in that compartment will run into the launder *L* and thence be raised by the pump back into the feed launder *N*. In that way the feed to each of the other machines is increased proportionately when one of a number of machines is stopped.

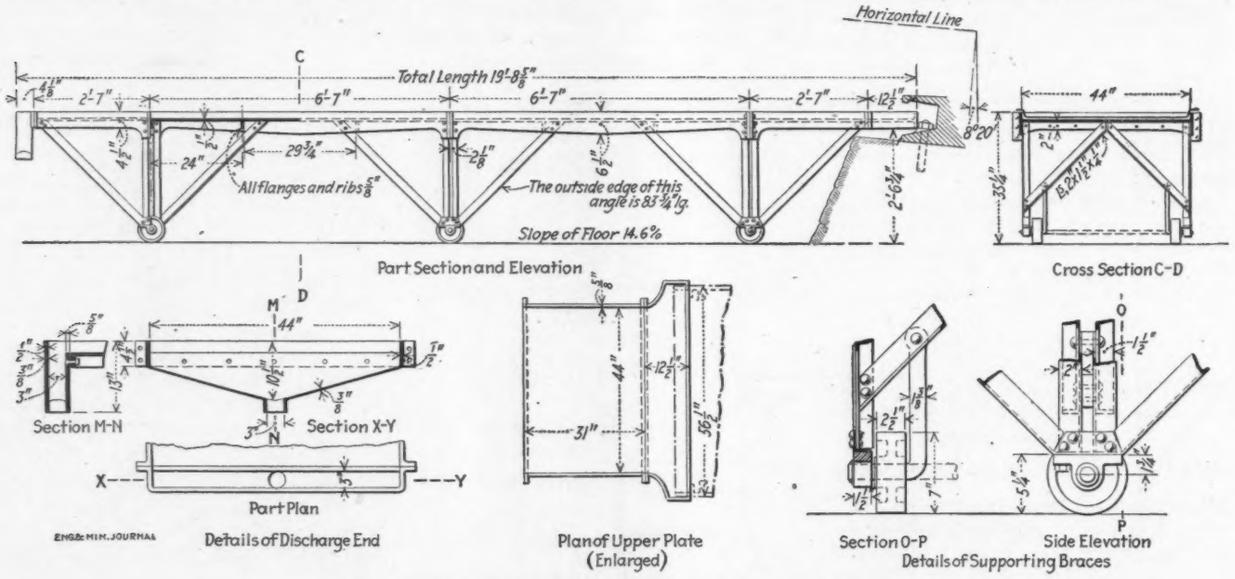
North Star Amalgamation Tables

The amalgamation tables in the Central mill of the North Star Mines Co., at Grass Valley, Calif., differ from those in the North Star mill of the same company and from the tables generally used in stamp mills, in that they are built entirely of metal. The construction of the table is shown in the accompanying illustration. It consists of an iron and steel support for the copper plates, equipped with legs mounted upon rollers so that the table may be moved away from in front of the battery at cleanup time or at any other time when it is desired to gain free access to the front of the batteries.

The copper plates are bent upward at the sides so as to come up to the top edge of the sides of the steel support, over which the plates are again bent, in a curve of fairly large radius, so as to lie horizontally over the edge in a band about one or two inches wide. These bends along the edges are well rounded so that the amalgamator experiences no difficulty in taking off amalgam—in tables where there is a sharp corner at the sides it is almost impossible for the attendant to remove the amalgam close up against the sides of the table.

At the North Star and Central mills mercury is fed to the battery at hourly intervals, the quantity being governed by the condition of a narrow strip of amalgam that is allowed to remain on the upper edge of the lip plate from one cleanup day to the next. The condition of this strip is an index to the condition of the amalgam on the chuck block.

The plates are dressed once per 24 hr., a whisk broom being used for the purpose. About 12 min. is spent in dressing each table, there being one for each battery of five stamps. The work is done by the amalgamator and by the concentrator attendant, both under the direction of the mill foreman. After the daily cleanup the upper plate of each battery is treated with mercury, the quantity used depending upon the judgment of the foreman. In general four ounces of mercury is added at the mortar for every ounce used on the plates. About 2½ oz. of amalgam is recovered from the mortars for each ounce cleaned from the plates. While the plates in front of one battery are being cleaned the pulp is run over the plates of the adjoining stamps.



ALL-METAL AMALGAMATION TABLE USED IN CENTRAL MILL OF NORTH STAR MINES CO.

Japan Gold Size for Joints

A jointing material of considerable value, not generally known, is Japan gold size, which is a liquid used by painters as a drier. In connection with pneumatic plants it can be used successfully and for compressor cylinder joints made with brown paper it has proved superior to the ordinary red lead and boiled-oil paint.

The material is sold by paint dealers and keeps well. Upon exposure to air it dries rapidly, forming a tenacious, adherent, transparent coating. Unfortunately, states A. L. Hass in *Power*, I have no data as to its behavior in joints having to withstand steam heat, but see no reason why it should not be tried.

Wooden Gaskets for Boilers

An engineer in the South uses, for his steam boiler handholes, gaskets sawed out of 5/8-in. white pine boards, states the *Engineer and Fireman*. They have to be screwed up about twice when heated up, and when taken out are about 1/16 in. thick. As they are cheap a new one is put in each time the boiler is cleaned.

Notes from Current Literature

Concerning Mining, Metallurgy and Industrial Chemistry

Use of Lands Held for Protection

The profitable use of land, which must be held in order to protect other rights, is again noted in the report of Ezra B. Whitman, Water Engineer of Baltimore. The city of Baltimore will probably acquire between 2000 and 3000 acres in the vicinity of a new reservoir site. In order that some income may be derived from this property it is proposed to re-forest this land, with the idea of later cutting the timber along scientific lines.

It will be recalled by our readers that the Tennessee Copper Co. recently established some experimental farms, in this case not so much to gain any benefit from the land in question, but to prove that the smoke from their smeltery was not injurious to vegetation. However, it has been claimed that the farms in themselves produced a profit. The same thing was done recently by a large chemical firm in New Jersey, and it is reported that the corn crop raised much more than paid for all of the labor and supervision expended upon it. Mining and smelting companies which must acquire lands near them to protect water power, mill sites or for dumping purposes, might be able to do something along the same line.

Gas Analysis in Fighting Mine Fires

A recent bulletin (Technical Paper No. 13) of the Bureau of Mines, is devoted to the systematic sampling of gases from burning mines, as an aid in fighting the fires. For instance, in a burning mine, samples were drawn from behind a dam erected to seal off the fire. One of these showed O_2, 1.69%; CO_2, 8.07; CO, 1.58; CH_4, 3.39; H_2, 1.37; N_2, 83.90%. Another, two days later, showed, O_2, 3.00%; CO_2, 8.14; CO, 1.41; CH_4, 1.21; H_2, 0.35; N_2, 85.89%. From these it would be inferred that the dams were tight, and that the fire was being brought under control.

Again, in the same mine, entrance was made to an area about 2000 ft. from the fire, also behind stoppings, and a man protected by a helmet took a sample of gas 800 ft. from the dam. At this point the air showed, O_2, 9.38%; CO_2, 5.33; CO, 1.02; CH_4, 1.13; H_2, 0.48; N_2, 82.66. Owing to the stagnant condition of the air, and the large percentage of CO_2, no apprehension would be left as to this air feeding the fire, while the knowledge that the CH_4 percentage was so low was valuable, as showing an explosion need not be feared from a sudden inrush of air. In other cases, samples withdrawn in this manner proved that the dams were not tight (shown by increase of free oxygen) which led to their timely strengthening.

Qualitative Reagent for Potassium

A reagent for the qualitative determination of potassium is prepared as follows (*Annal. de Chim. Analyt.*, Apr., 1912). To a solution of 100 grams of sodium nitrite in 200 c.c. of water add 60 c.c. of 30% acetic acid, and then 10 grams of cobalt nitrate. Filter after allowing to stand two days, and make up the volume to 400 c.c. To use the reagent, place two colorimetric glasses on a mirror, place in the first 5 c.c. water, in the second 5 c.c. of the solution to be tested, then add to each one, 2.5 c.c. of the reagent and 5 c.c. of 25% alcohol. A turbidity with as little as 2 parts per 1,000,000 indicates potassium.

Composition of Analcite

The mineral analcite is the most important normal metasilicate among the zeolites, and has been the subject of repeated investigations. The usually accepted formula is $Na_2Al_2(SiO_3)_4.2\,H_2O$. Foote and Bradley (*Amer. Journ. of Science*, May, 1912) deduce its formula as $Na_2Al_2(SiO_3)_4.2\,H_2O.xH_2Si_2O_5$. This does not necessarily mean that the compound $H_2Si_2O_5$ is necessarily in solid solution, as it may exist in highly complex silicates. It may be noted that the water of crystallization of the zeolites does not behave as does ordinary water of crystallization, i.e., the vapor pressure at a given temperature does not remain constant as the substance is dehydrated, but continually diminishes. For this reason zeolites do not lose a definite number of molecules of water by heating at any certain temperature or through any certain range of temperatures.

Prevention of Ankylostomiasis

The danger from hookworm disease through energetic mine sprinkling has been commented on several times: Experiments have proved (*So. Af. Min. Journ.*, Jan. 20, 1912) that a 1% solution of ferrous sulphate, or a 2½% solution of calcium chloride or salt prevents the disease.

The use of these chemicals in concentrated solution in wet mines also seems indicated. Where it is available sea water is effective.

Effect of Metal-Bearing Aggregate on Concrete

The attention of mining engineers should be given a late report by A. F. Coleman (*Eng. Record*, June 1, 1912), who used a rock carrying 0.3 to 0.6% Ni; 0.2 to 0.4% Cu; Fe, 15 to 18%; S, 0.5 to 0.75%, for the aggregate in concrete. Three years' exposure to the weather completely disintegrated the structures built of this material, while neighboring structures built with the same cement and sand, but nonmetalliferous stone, show no signs of disintegration. The trouble is alleged to have been caused by sulphides.

Flux for Scrap Lead Refining

A flux for refining scrap lead consisting of three parts of caustic soda and one part of sulphur has been patented recently in Germany (*Brass World*, June, 1912). About two pounds per 100 lb. of lead are employed. The lead is heated to about 400 to 500° C., the flux added, and the whole mass well stirred. It is stated to be effective in removing zinc, arsenic, antimony, tin and copper. [The use of sulphur for producing a dry, easily skimmed dross with white metals is, of course, well known.—EDITOR.]

Preservation of Mine Timbers

The general question of the preservation of mine timbers is dealt with in a recent bulletin of the Department of Agriculture (Bull. 107). The great importance of timber preservation is urged on the ground that of timber sent underground, wear destroys 5%; breakage and fire, 20%; waste, 25%; decay and insect attack, 50 per cent.

A simple and inexpensive method of protecting timbers is by peeling. Bark retards the loss of moisture from timber, and unbarked wood therefore offers more favorable conditions for fungus growth than wood from which the bark has been removed. Moreover, the space between the bark and the wood is an excellent breeding place for many forms of wood-destroying insects. In dry workings, the life of the wood may be increased 15% by peeling although in wet situations peeling seems to have but little effect.

Seasoning also adds to the life of mine timbers in dry places, although it is of doubtful value in wet workings. Moreover, both peeling and seasoning, if done at the shipping point, will save greatly in the expense of shipping and handling.

Timber which is to be treated should be round rather than square, as sap wood is more easily impregnated than heart wood. Zinc chloride and creosote oils have shown the best results up to date. A wood-treatment plant will pay for itself if the amount of wood to be treated is large; if small, brush-treatment is recommended. If treatment is to be given, the timber should be carefully inspected, as expensive treatment is wasted on unsound timber.

Sulphur in Steel

The effect of sulphur on steel has been exhibited in a new way by F. Rogers, who reports his experiments to the Iron and Steel Institute, May, 1912. Doctor Rogers has worked out a method for the examination of the fractured surfaces of steel, similar to the ordinary method of contact printing. In applying this method, he finds that the speed of printing is often 100 times as great on a fracture as on a cut surface taken as near the fracture as possible. From this he argues that the fracture is through the particles of manganese sulphide in the steel. While it may be urged that in a cut surface there has been a "flow" of metal produced over the manganese-sulphide particles, the author believes this cannot be the case, as contact prints made under otherwise similar conditions are alike whether the cut be rough-cut, filed smooth, polished with emery, or highly polished for microscopic examination. In the same way, the intensity of the fracture print seems independent of the method by which the fracture is produced.

From this the author further deduces that it is by no means immaterial whether a steel carries 0.035% S, or 0.05% S. Any increase, however small, must be deleterious.

The Refining of Blister Copper

The late H. H. Emrich has a paper on the refining of blister copper in the June Bulletin of the A. I. M. E., from which we abstract the conclusions. The impurities in cast electrolytic copper are present in about the same proportion as they exist in the heaviest float slime, and are there because of that float. Copper of good conductivity can be deposited from an electrolyte containing as high as 17 grams of arsenic per liter. Of anode impurities, all the lead, 26.7% of the arsenic, all of the autimony and all of the nickel went to the slime. The author attributes the sliming of the nickel to the formation of a nickel speiss, and believes that a surplus of nickel over that necessary to satisfy the arsenic would be dissolved.

Huff Electrostatic Concentrators

The following details of the general features of the Huff electrostatic installations are taken from a paper by Henry A. Wentworth on "Electrostatic Concentration or Separation of Ores" (*Bull.* A. I. M. E., June, 1912). The cost of construction and of operation depends upon the general costs in a given region, upon the size of operations, and whether the plant is to run as an independent concentrator, or as an adjunct to other operations. However, the following details will, with modification to suit the circumstances, give a proper total.

The flow is ordinarily: Rotary drier (not roaster); screens (12, 12-20, 20-50, and minus-50 mesh); roughing machines for making finished tailings; finishing machines for making finished concentrates; and a recrushing device for the middlings. The dust is drawn from each piece of apparatus and collected (saved if of sufficient value, discarded if not). The separators are upright, about seven feet high, and occupy about 1.5x6 ft. of floor space. Allowing room for attendance, each machine occupies about 5x8 ft. of floor space. From nine to 12 tons per separator can be taken as an average on the initial machine floor. The general tonnage area is about four square feet per ton for separators, and about six square feet per ton including elevators, belts, etc. The Midvale, Utah, plant with a daily capacity of 75 tons of fine material, occupies a building 40x40 ft., but there is a large amount of unoccupied space at present. The driers are usually in the basement, and the screens in a tower above the concentrator floors. The general costs of installation are similar to those of the ordinary gravity concentration, except that the elevators do not have to handle water, and because of the small size of the building there is a minimum of distributing machinery.

The operating costs, outside of dry crushing, are: Drying, power, labor, and repairs. Crude mine ore usually contains 1 to 5% of moisture, say 3% as an average. As a fairly efficient drier will evaporate 5 lb. of water per lb. of coal, this means about 12 lb. of coal per ton of ore, say $0.03 per ton of ore. Fine middlings from wet tables will carry 15%, but as the drier will then be more efficient, the cost will only be $0.11 to $0.12. A 3-hp. generator set will supply the electrostatic power for separation. Mechanical power for driving the separators is figured at ⅓ hp. per separator, including line losses, so that with large installations the entire power, including elevators, screens, etc., amounts to approximately ⅙ hp. per ton of daily capacity. As everything in a properly designed mill is automatically handled, with the exception of firing the drier, the labor required is needed only for watching the mill and for loading the products. In general, the costs of operation in an electrostatic mill do not differ materially from those in a similar mill using reciprocating tables.

The Combustion of Carbon

The sequence of events when carbon burns in oxygen is discussed by Rhead and Wheeler (Chem. Soc. Proc., p. 105, 1912; abstr, *Journ.* Soc. Chem. Ind., May 31, 1912). The alternatives are:

(*a*) $C + O_2 = CO_2$, followed by

(*b*) $CO_2 + C = 2CO$;

and

(*c*) $2C + O_2 = 2CO$, followed by

(*d*) $2CO + O_2 = 2CO_2$.

The authors attempted to obtain evidence as to which reaction is most likely to take precedence at different temperatures, by determining the relative velocities of the above reactions under the same experimental conditions. The results obtained showed: (1) that some carbon monoxide is produced during the oxidation of carbon at low temperatures, under conditions which do not admit of the reduction of carbon dioxide by carbon. On the other hand, (2), carbon dioxide is produced at low temperatures in quantity which cannot be altogether accounted for by the supposition that carbon monoxide is first formed and then oxidized to carbon dioxide. When carbon is burned at low temperatures, therefore, carbon dioxide and carbon monoxide are produced simultaneously.

Roumanian Petroleum Production

In 1911 there were 1,404,400 metric tons of petroleum delivered to the Roumanian refineries (*Journ.* Soc. Chem. Ind., May 31, 1912), compared with 1,215,300 metric tons in 1910, an increase of over 15 per cent. The yield from the refineries in 1911 was: Benzine, 260,653 metric tons; burning oil, 312,711 metric tons; mineral oil, 24,703 metric tons; and residue, 783,136 metric tons. About half the production was used in Roumania.

Murex Process

According to the Prussian *Zeitschrift für das Berg-, Hütten- und Salinenwesen,* the Murex process has been tried at the Bergwerkswohlfahrt mine, Zellerfeld district, producing lead concentrates carrying 50% lead, with a 2% tailing. The ore is reduced to 1 mm., emulsified with oil and magnetite dust, and then passed over a strong electromagnet, which extracts the magnetite covered galena.

Lining the Snake Creek Tunnel

By Oscar N. Friendly*

The Snake Creek drainage, development and mining tunnel in the Park City district, Utah, was started in the spring of 1910. Swelling ground was shortly encountered, necessitating the use of temporary timber sets, followed closely by the specially designed egg-shaped reinforced-concrete lining. By this construction the tensile stresses are borne largely by the steel; the compressive, by the concrete.

*Mining engineer, Daly-Judge Mine, Park City, Utah.

The Snake Creek tunnel is designed to be the main artery for a project to develop, mine and drain the territory of the Snake Creek Mining & Tunnel Co.'s property and adjacent holdings in the Snake Creek, Upper Cottonwood and Park City districts, situated in Wasatch, eastern Salt Lake and Summit Counties, Utah. It is financed by the Knight and Daly-Judge interests, both of whom have valuable holdings in the territory to be developed.

Tunnel for Drainage and Mining

The driving of this costly adit is the result of a desire to open up the mining possibilities of this region, at depth, and in a manner which will permit mining and development work on a large scale, and on an economical basis. In this region, where depth is imperative, water presents an almost insurmountable barrier for deep-shaft mining without an adequate gravity drainage. The officers of the tunnel company are: Jesse Knight, president; H. Otto Hanke, vice-president; G. W. Lambourne and J. William Knight, directors. G. W. Lambourne, as general manager, has general management of all operations. I have acted as the engineer of the company.

The lines of the tunnel were run in the autumn of 1909, and ground was broken the following spring. The work is being carried on by contract. Free & Taylor have the contract for driving the first 13,350 ft. They are required, by the specifications, to make a minimum monthly advance of 300 linear feet.

The dimensions of the bore are as follows: Height of back above top of rail, 6½ ft.; width, 9 ft. 4 in. in the clear. On the right-hand side a concave water channel is cut, 4 ft. in width and 4 ft. 2 in. in depth below the top of the rail. Ties are of 5 x 7 Oregon fir, with 3-ft. centers. On the right-hand side a 16-in. No. 16 gage galvanized-iron ventilator pipe is laid on the ties. On the left-hand side a 4-in. air main is carried. The grade of the tunnel is 3 in. to the 100 ft. (0.25%). The width of the tunnel is designed to permit room for a double-track haulageway. The right-hand side, over the ditch, will accommodate the ingoing or empty trains; the left hand, the outgoing or loaded trains. This will permit the heavy traffic to pass over the portions of the ties resting on solid rock. The capacity of the tunnel for transportation is practically unlimited. It is planned to run a series of laterals where conditions justify. The main tunnel will later be run as two separate headings, one of which will prospect and drain the Daly-Judge property.

Trouble with Swelling Ground

The first 3000 ft. of the tunnel were cut through ground of good standing quality. At this point, however, serious difficulties were met with. The formation changed from a limestone to a highly decomposed black lime shale with pronounced swelling qualities. This was first timbered with 10x10 Oregon fir by the contractors. Swelling of the ground caused immediate trouble. Although constant work was done on the timbering, at the end of four months conditions were so serious that the company found it imperative to take steps to re-line this portion of the tunnel, for a distance of 305 ft. I was asked to submit plans for holding this ground permanently. The purpose of this article is to give details of these plans, methods, and cost of erection, as it is believed they are along new lines, and may be of interest to the profession.

A few words on the conditions met with at the beginning of this work, and the nature of the ground may be of value. The formation, as before mentioned, was a decomposed black lime shale, almost jet black in color. The harder portions were composed of masses containing innumerable fractures and slips, which disintegrated rapidly when exposed to the action of air. The softer portions were a black sticky mud, looking and feeling not unlike the ordinary paste shoe blacking, and containing large boulders (nigger heads) of hard limestone. The latter made spiling difficult and in many cases required blasting.

One of the most difficult features of the work to overcome during the placing of the concrete, was the handling of the large flow of water in a manner which would insure safety from flooding the fresh cement. This was made doubly difficult by unavoidable caves, due to the fact that the tunnel was being enlarged and retimbered at the same time that the new lining was being placed. This phase of the work is in a large measure responsible for the high cost of the temporary lining. An 18-in. steel riveted pipe was finally procured to carry this flow, which amounted to five second-feet. This pipe gave good satisfaction.

Start of Snake Creek Tunnel before Reaching Bad Ground.

Unfinished Lining and Pump for Handling Seepage

A series of concrete bulkheads was constructed to a height of 2 ft. above the rail on each side of the portion of the ground to be concreted, and the water transferred through the pipe, which was laid on ties, from bulkhead to bulkhead. A simpler solution would have been to seal the tunnel entirely, but this was impracticable. The fractured nature of the ground permitted too much seepage. Holding the water back under even a 3-ft. head required the presence of two pumps and a number of bulkheads to handle this flow through the crevices, and keep the water below the bottom of the concrete.

Timber Sets Precede Concrete

The plan adopted for placing the temporary lining was to retimber, with regulation tunnel sets, the portion of the tunnel directly in front of the advancing concrete forms. Special effort was made to keep the new lining as close to the retimbered portion as the work would permit. Notwithstanding this, however, great trouble was experienced in holding the ground for this short length of time. The soft-bog bottom permitted the posts to sink. Two caves carried away portions of the new timbering on different occasions, one of which closed the tunnel completely, causing a delay of two weeks in regaining the lost ground. At points, the height of the unbroken back above the caps approximated 40 feet.

In the heaviest part of the ground the caps were six 8x8 Oregon fir timbers to the set, which were placed on 4-ft. centers,—three side by side and two deep, making the cap of each set 24x16 in. Spiling and breastboarding was of 5x7-in. Oregon fir. In this part of the work the caps would show flexure within 24 hours after being placed in position, using all the clearance and requiring cutting to allow room for the concrete lining. In this part the strength of the lining was increased, and provision made against a concentrated load at the center of the arch, as will be described later.

Throughout the work, precautions were taken to leave no open spaces outside the concrete to endanger the structure, after completion, from sudden falls of rock. Open spaces above the spring of the arch were filled with aspen-pole lagging, both above and below the timbering. This affords a cushion and provides against impact. The accompanying halftone showing a section of lining at a point near start of work, before spiling became necessary, illustrates the manner in which this was done.

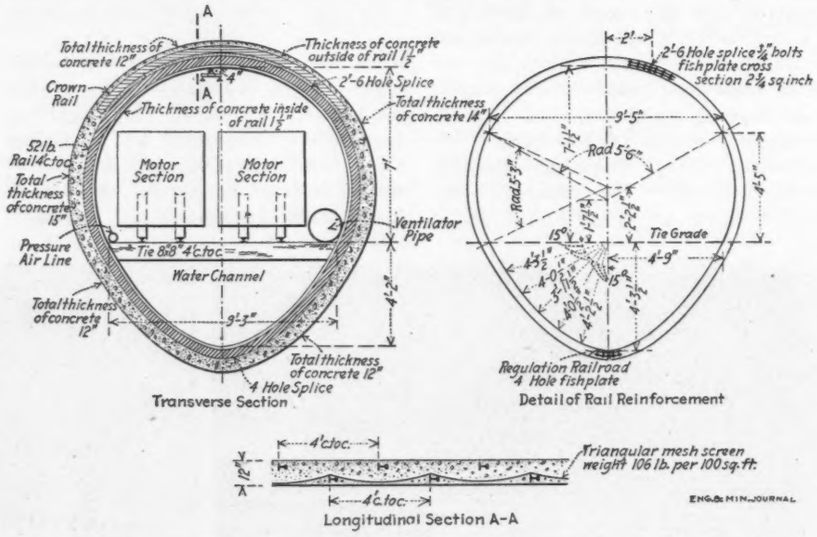
The dimensions inside the temporary lining were: Height, bottom of cap to bottom of ditch, 13 ft.; width between posts at tie grade, 13 ft.; batter of posts, 1 in 7. The original tunnel, 6½ ft. above the rail and the ditch, 4 ft. 2 in. below rail, had, through a large portion, decreased in height 2 ft. and the ditch bottom rose a like amount, due to swelling. All rock removed was trammed by horses 3000 ft. to the portal. None of it was of a nature to permit its being used as filling or aggregate.

Before entering into the details of the form of construction adopted, a few words as to the direction and nature of the pressures may be of interest. The maximum pressure was not from the top but from each side, near the top of the posts and parallel to the bedding planes; the force exerted being in the nature of a squeeze, due to swelling from air slack. A second line of pressure is in the ditch where the ground exerts an upward force, which acts quickly when the surface is exposed to water. In the worst portions there is no solid bottom, though occasional hard ribs are present.

Various Methods of Reinforcing

In the straight-roof and batter-wall system of reinforced-concrete lining commonly met with, the concrete is permitted to take stresses for which it is not adapted. The inside (tunnel) face along the battered wall is subjected to extreme tension, due to the bending movement caused by the pressure from along the sides. This applies both longitudinally and transversely. Where the top has no curvature, the center or weakest portion is subjected likewise to the same objectional tension. In the case of the arched roof, with straight batter wall, when load is on center of arch, the upper corners on the outside (rock) face will meet with the same tensile force and in a place difficult to overcome. Engineers have, in a measure, attempted to reinforce the concrete by the use of various types of iron bars, but for tunnel work, this method leaves much to be desired.

Another popular method has been to use a steel set of *I*, *H*, or built-up beams bedded in the concrete. This system unquestionably gives a strong structure, but tends to place the steel and concrete indiscriminately in places of tension and compression. Of necessity, a portion of the metal lies along the neutral axes, and does no work. An additional objection lies in the fact that the straight wall and roof must be adhered to in this form of construction, and even though expensive segment sets be used, all the advantage gained by arch or circular construction is lost.



Design for Reinforced-concrete Lining, Snake Creek Tunnel, Park City District, Utah

Concrete and Steel Compared

Roughly speaking, for the same sectional area, the compressive strength of steel is 30 times that of concrete, and the tensile strength 300 times as great, with a cost of 50 times as much per unit column. For tensile forces, steel has but one-sixth the cost of concrete, while for compressive forces, concrete has but six-tenths the cost of steel. Manifestly the most perfect reinforced-concrete structure, from an engineering standpoint, is the one which gives the maximum strength for the least expenditure of materials and labor; or the one which most nearly approaches the condition where all the compressive stresses are taken up by the concrete and all the tensile stresses by the steel; and also takes advantage of the flexibility of the materials of construction, to permit the use of the best load-sustaining shapes. It was with this idea in mind that I designed the structure here described.

Structure is Egg Shaped

The structure, as can be seen by reference to the accompanying transverse section, in egg-shaped, point down, of proper size to accommodate a double-track, electric-haulage system with a water channel 4 ft. 2 in. below the rail. On 4-ft. centers are placed oval forms of mild-steel 52-lb. rails, spliced at bottom, and two feet from center of arch at top. The lower splice is made by the regulation four-holed railroad fishplate. The upper splice was specially made and was designed to have a slightly greater strength than the rail itself. The splice was so placed as to enable the complete use of all the metal in a 30-ft. rail; circumference of form, 34 ft.; length of segments, 19 and 15 ft.; length of crown rail, 11 ft. This oval steel was placed 1½ in. from the inner (tunnel) face of the concrete, on 4-ft. centers. The 11-ft. or crown rail was placed on 4-ft. centers also, but staggered 2 ft. with reference to the ovals. This crown rail is placed 1½ in. from the outside (rock) surface of the concrete.

Catching-up Cave and Water Under Track, Snake Creek Tunnel

Wrapped about and extending between the oval rails throughout the complete oval, is a heavy triangular-mesh, mild-steel netting, weight 106 lb. per 100 sq.ft. This netting has a width of 54 in., allowing a 3-in. lap over each rail, and covers the interior portion of all the lining. It is allowed to sag to within 1½ in. of the inside face at a point midway between the forms. The ties on which the tracks are laid are 8x8 Oregon fir, and are firmly sealed in the concrete walls. The thickness of the concrete is 12 in. on top and bottom, with walls of 14 and 15 in. thickness. This is the minimum thickness used, and it was exceeded on an average of 42%. Reference to the sections will make the form of construction clear.

Functions of Steel and Concrete

The reasons for using this method of placing the reinforcements are these: As said before, the maximum stresses act from the two upper corners. This would cause a compressive stress on the outside (rock) face at the point of application, and a tensile stress at a point directly within. This compressive force is carried by the concrete; the tensile force by the steel in the inner rail. At the same time this force will exert a tensile force on the outside (rock) face at a point near the center of the arch. The crown rail is here to take this tension and together with the weight of the ground on the cap above, prevents any upward movement. The corresponding compressive stress directly below on the inner face is carried by the inside form and the concrete. The crown rail also will help distribute and take care of any stress caused by impact from falling ground above. At the same time these forces from the corners exert a similar series of forces, compressive inside and tensile outside, at a point near the spring of the arch. At this point the concrete is sealed tightly against the posts and wall, which will prevent any outward displacement. The oval rail, at this point, acts against compression. The concrete here is, in places, 30 in. thick. At this point it must also take up the horizontal thrust from the weight on the arch, but as said before, being sealed tightly against the wall, no outward movement is possible.

Below, in the ditch, the swelling ground exerts a constant pressure. The tensile forces on the inside (tunnel) face are taken care of by the oval rail. The tensile forces on the outside meet with no resistance from steel, but are provided for by the high curvature of the point and the upward pressure of the ground at this place. The 8x8 ties sealed in the concrete, in addition to furnishing the necessary foundation for the tracks, tend to prevent the egg from collapsing along its long axes and to add stiffness to the structure.

In addition there will be a longitudinal stress between the steel forms tending to force the walls inward. For this reason, the netting was placed as shown. This force will subject the entire inner face, where not otherwise acted upon by the stronger forces described above, to a tensile force. The wire was therefore made to sag as near the inner surface as practicable. The netting, in addition to taking care of this tensile force, acts as a bond, and takes up internal stresses due to the natural contraction of the concrete in setting. All steel was placed at least 1½ in. from the surface to protect it against oxidation.

In the heavier portions of the ground, special precautions were taken to prevent a concentrated load from the bending of the caps from being applied at the center of the arch. The method here used was to concrete tightly against the caps along the side, allowing a small clearance between them and the top of the concrete in the center. In addition, five-foot, 20-lb. rails were placed longitudinally along the arch and resting on the forms. However, this was only done in one place where the failing caps made it probable that the concrete would take weight before setting.

The aggregate used was dump material composed of hard, cherty limestone. The natural fines in it were used in place of sand. While it was not an ideal aggregate, the absence of sand in the proximity of the tunnel made its use neces-

COST OF SNAKE CREEK TUNNEL CONSTRUCTION

Opening Tunnel

Supplies:	
Timber	$1,653.16
Powder	98.35
Supplies	721.25
Tramming (feed)	226.10
Power	541.74
Cement bulkheads	28.00
Total supplies	$3,268.60
Labor:	
Supervision	$2,032.50
Timbering	4,163.55
Mucking	2,872.07
Tramming	1,173.25
Compressormen	1,010.00
Outside general	258.00
Aspen filling	173.90
Blacksmith	344.75
Insurance	155.00
Total labor	$12,183.02

Reinforced Concrete Lining

Supplies:	
Cement	$2,603.32
Steel	1,761.85
Gravel and sand	30.00
Total supplies	$4,395.17
Labor:	
Placing concrete and reinforcement	$1,797.51
Gravel, sand and water	1,648.15
Fitting reinforcement	214.26
Plastering ditch	173.66
Total labor	$3,833.58
Grand total	$23,680.37

	Per foot
Total footage costs:	
Cement and steel f.o.b. Salt Lake	$9.66
Haulage and freight on above to tunnel	4.75
Labor in placing lining	12.56
Total cost of lining	$26.97
Cost of opening tunnel and temporary lining	50.66
Total cost of work	$77.63

sary. No sand was used except in the plastering of the water channel. The cement was all portland. The mixture was 1:7 at first, which was later changed to 1:6. Tests showed the aggregate to set to a strength of 10% under the requirements of the standard specifications, which was considered very satisfactory under the circumstances.

Costs High

The cost of the work is somewhat higher than in most places, owing to the higher wage scale, $3.25 to $4 per day, and to the high cost of freight and haulage over mountain roads. The accompanying cost tables are self-explanatory.

The high cost of preparing the tunnel is due to the difficulties with which it was necessary to contend, and has no relation to the method of lining used. The same work would have been necessary had any other kind of permanent lining been adopted.

The rails were old railroad rails in first-class condition, of which a ready supply is available at 1c. per lb. The cost of each set of three rails, two segments and crown bent hot, splices made and ready to be set in place, including the cost of all materials, was $19.55 f.o.b. Salt Lake City. The weight per set was 800 lb. One of the chief advantages claimed for the system of reinforcement used is the low cost of material and construction, as compared with the high cost of raw material of an H-beam set where all material must be new. The disadvantages of the beam-set construction seem to be: The high cost of making; the greater cost of erection, together with the impossibility of placing the metal without waste of material in the structure where it will do all the work it should do in concrete construction. The bent-rail form, therefore, involves but a small fraction of the cost of the beam set. It also has the advantage of being applicable to arched and curved linings; is elastic in its uses; the forms can be varied in their distances apart, etc., according to conditions on the ground, without extra expense or delay. The time of erection and centering one rail form in the tunnel by four men varied from 20 to 30 minutes.

The work of preparing the tunnel was done by day's pay; mixing and placing the concrete and reinforcement by contract to Mitchell & Jordon, contractors. The crew were in charge of Free & Taylor, the tunnel contractors.

In conclusion, I will say that the concrete has now stood for three months in the heaviest portion of the ground without showing any effect from the weight it is supporting. Accurate instrument measurements show that there has been no settling or movement in any direction.

Mine Sampling and Valuation*

By H. S. Munroe†

In connection with the subject of mine valuation, some charts which I use in my lectures on the subject at the School of Mines may be of interest to the members of this society. The first of these charts is intended to emphasize the importance of taking into account the specific gravity of the ore in obtaining average values from a series of samples. For the purpose of illustration I assume five samples taken at uniform distances in a galena vein, varying in thickness from 10 to 60 in. and the ore varying from 10% to 80% of lead.

TABLE I. AVERAGES OBTAINED WITHOUT USING SPECIFIC GRAVITIES

Thickness, inches		Per cent. lead		Inch-per cent.
60	×	10	=	600
20	×	40	=	800
50	×	25	=	1250
10	×	80	=	800
10	×	60	=	600
5/150		5/215		150/4050
Averages 30 in.		43.0% (Arithmetical)		27.0% (Volumetric)

TABLE II. AVERAGES OBTAINED USING SPECIFIC GRAVITIES

Thickness, inches		Specific gravity		Inch-gravity		Per cent. lead		Inch-gravity-per cent.
60	×	3.0	=	180	×	10	=	1800
20	×	5.0	=	100	×	40	=	4000
50	×	4.0	=	200	×	25	=	5000
10	×	7.5	=	75	×	80	=	6000
10	×	6.0	=	60	×	60	=	3600
150				150/615				615/20400
				4.1 Average spec. grav.				33.17 Average per cent.

Calculating the average in the usual way by multiplying the thickness in inches by the per cent. in lead and dividing by the total number of inches, we find for our average value 27%, which we may call the volumetric average. This is less than the arithmetrical average, which in this case is 43%. Neither of these results, however, is correct, as the values obtained from sampling must be given weight in proportion to the tons of ore which each sample represents. In the second table I have introduced specific gravity as well as thickness.

If we multiply the thickness in inches by the specific gravity of the sample, we obtain a product which we may call the inch-gravity value, which is a unit proportional to the tonnage represented by the sample. Multiplying this by the per cent. of lead found by assay we get an inch-gravity per cent. product. Dividing the sum of these last products by the total of the inch-gravity column we obtain as the average per cent. 33.17, which lies between the volumetric and the arithmetric average. This we may call the gravimetric average.

Tables III and IV illustrate the necessity of pursuing the same plan when dealing with a gold or silver ore in which the gangue consists largely of heavy sulphides. The volumetric average obtained by the inch-dollar basis is $5.43; the real average value based on tonnage will be $6.47.

TABLE III. VOLUMETRIC (USUAL) METHOD

Thickness, inches		Value, per ton		Inch-dollar
15	×	2.	=	30
10	×	1	=	10
5	×	12	=	60
3	×	20	=	60
2	×	15	=	30
5/35		5/50		35/190
Averages 7 in.		$10 (Arithmetric)		$5.43 (Volumetric)

TABLE IV. GRAVIMETRIC METHOD

Thickness, inches		Specific gravity		Inch-gravity		Value per ton		Inch-gravity value
15	×	2.6	=	39	×	2	=	78
10	×	2.8	=	28	×	1	=	28
5	×	3.8	=	19	×	12	=	228
3	×	4.0	=	12	×	20	=	240
2	×	3.5	=	7	×	15	=	105
35				35/105				105/679
Averages				3.0 Spec. grav.				$6.47 Gravimetric average

In both cases it will be seen that the errors that result from neglecting the specific gravity of the ore may be serious. The specific gravity of the different samples may be readily determined by the bottle method, using for this purpose material from the portions of each sample which are rejected when crushing and working down the mine sample to the usual bottle sample for assaying.

I shall also call attention to the use of the well known formula for determining the probable error of the arithmetical mean of a number of observations. The use of this formula for the study of sampling data will give us valuable information as to the accuracy of the final result and enable us to deal intelligently with high assays.

If n = number of observations, and d = difference of each from the arithmetical mean, then the

$$\textit{Probable error} = 0.6745\sqrt{\frac{d^2_1 + d^2_2 + d^2_n}{n\,(n-1)}}$$

E. H. Garthwaite has given some interesting results[1] from the sampling of a gold mine in Rhodesia. In one case, the second example cited, 71 samples were taken at 2-ft. intervals. A summary of these results, as given by Mr. Garthwaite, is given in Table V. It will be noticed that there are a number of high assays and, apart from this, that the range in values is very great.

Including all assays, the average value is 43.35 dwt. Applying the formula we find a probable error of plus or minus 8.15 dwt., that is, the value lies somewhere between 35.20 dwt. and 51.50 dwt.

*A paper read at the meeting of the New York section of the Mining and Metallurgical Society of America, May 16, 1912.

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[1]Trans. I. M. M., January, 1907.

If we omit the one high assay, which lies between 700 and 800 dwt., the average of the remaining 70 samples lies between 31.08 and 33.49 dwt., or, say, 32.29 dwt., or somewhat less than the lowest probable value. Even omitting this high assay, the probable error is plus or minus 4.16 dwt., which still leaves much uncertainty as to the real value of the ore. It is evident in this particular case that the mine is very spotty, and that a safe average value can be obtained only by increasing the size of each sample or the number of samples taken. If large samples had been taken it is possible that the variation in value would have been less and the probable error much smaller.

TABLE V. SUMMARY OF ASSAY RESULTS

Assay value, dwt.	No. of samples	Assay value, dwt.	No. of samples
0- 5	13	50- 75	6
5-10	17	75-100	5
10-20	17	100-200	3
20-30	3	200-300	1
30-40	5	300-700	none
40-50	none	700-800	1
			71

TABLE VI. EFFECT OF VARYING SAMPLING DISTANCE

Sampling distance, ft.	Average value, dwt.	Average width, in.	Sampling distance, ft.	Average value, dwt.	Average width, in.
2	43.35	32.0	8	22.74	32.0
4	35.16	32.0	10	20.26	32.5
4	50.84	32.5	10	90.37	30.0
6	28.17	32.0	10	44.85	30.0
6	66.57	29.5	10	29.97	34.0
6	33.52	33.0	10	29.87	32.0
8	35.13	31.0	Independent sampling		
8	79.34	32.0	10	14.60	35.3
8	33.18	33.0	10	16.00	32.0

Mr. Garthwaite made some interesting comparisons of results that would have been obtained with other sampling distances. For example, taking every alternate sample in the mine he obtained two sets of results for a 4-ft. sampling interval. By taking every third sample he obtained three results, which would have been obtained by sampling at 6-ft. intervals. By taking every fourth sample he obtained four sets for an 8-ft. sampling interval, and in a like manner, by taking every fifth sample he obtained five different values for the mine with a sampling distance of 10 ft. These results are given in Table VI. Making the proper substitutions in the formula, the probable error in each case is as shown in Table VII.

Comparing the theoretical range of values it will be seen that with the 10-ft. sampling interval the values actually obtained in the mine ranged from 14.60 dwt. to 90.37 dwt. The error of the mean is only a probable error; therefore, the actual error is certain to be more than this probable error in some cases. The same will be observed in the case of the probable and actual errors in the 8-ft. sampling interval, although the number of results being small, the variation is not so great. The 6-ft. sampling interval with only three results shows a very close correspondence with the theoretical values. The 4-ft. sampling interval with only two results does not reach the theoretical extreme values. We may extend the application of the formula by computing the probable results for 1-ft., 6-in. and 3-in. sampling intervals. Under the last supposition 561 samples would have been taken, forming a sample practically continuous, but even in this case the values would range from 40.25 dwt. to 46.45 dwt., or a range of 14.3% if referred to the 43.35 dwt. average.

TABLE VII. PROBABLE ERROR IN SAMPLING RESULTS

Sampling distance, ft.	Samples taken	Average value, dwt.	Probable error	Extreme values (theoretical)	Results obtained
10	15	43.35	±17.74	25.51—61.09	14.60—20.26—29.87—29.97—44.85—90.37
8	18	43.35	±16.42	26.93—59.77	22.74—33.18—35.13—79.34
6	24	43.35	±14.12	29.23—57.47	28.17—33.52—66.57
4	36	43.35	±11.45	31.90—54.80	35.16—50.84
2	71	43.35	± 8.15	35.20—51.50	43.35 sampling distance actually used.
1	141	?	± 6.12	37.23—49.47	28.6% probable variation.
0.5	281	?	± 4.10	39.25—47.45	18.7% probable variation.
0.25	561	?	± 3.10	40.25—46.45	14.3% probable variation.

South African Diamond Field

JOHANNESBURG CORRESPONDENCE

The Premier Mine, for the six months ended Apr. 30, 1912, treated 4,233,200 loads (16 cu.ft. each) of blue ground for a yield of 881,518 carats of diamonds. The yield per load in depth shows a continued and disquieting decrease. The yield for this period was 0.208 carat per load, compared with 0.213 of last year and 1.25 at commencement of operations. Flottmann hand hammer drills are now used for drilling in the opencut.

The report of Voorspoed Diamond Mining Co., for the year ended Dec. 31, 1911, shows that 1,715,884 loads, of 16 cu.ft. each, were washed and 42,464 loads of waste rejected. The total working cost was 2s. 3.92d. per load washed; the cost of treatment was 8s. 3.9d. and 14.10 carats per 100 loads were recovered, against a yield of 16.62 carats for 1910. The working profit amounted to £21,840. The treatment plant is unsuitable, pug mills being unable to break up the blue ground properly, and rolls will have to be installed.

The annual report of the Roberts Victor Diamond Mining Co., which was once the richest diamond mine in Africa, shows that pipes, like lodes can go wrong in depth, as the 630-ft. level was declared unpayable, owing to the presence of boulders, broken ground and a contracted pipe. A fissure or dike leading from the pipe is being worked and about a year's work remains in sight.

The Casper, Wyo. Oil Field

BY C. E. JAMISON*

About 50 wells have been drilled in the Salt Creek oil field, 45 miles north of Casper, all being reported as productive. The daily production per well ranges from 100 to 1600 bbl. The oil is high in grade, of paraffin base, 39° to 42° Bé. Analyses show it to contain 17% gasoline, 30 kerosene, 53% lubricating oils, paraffin and coke.

Two refineries have been erected at Casper, and two 6-in. pipe lines have been laid to the field. Gasoline, kerosene, fuel oil, and a large variety of lubricants are now being produced. Reliable figures are difficult to obtain. However, it is reported, on what seems to be good authority, that the Chicago & Northwestern Railway is now consuming 3500 bbl. of fuel oil per day, while the Burlington has recently signed a contract calling for 4000 bbl. per day.

As the refineries are new and not yet working at full capacity, the output of the field is somewhat curtailed—about 6000 bbl per day. The production of which the fields are capable at the present time is between 12,000 and 15,000 bbl. The largest company in the field is the Wyoming Oil Fields Co., Ltd., a consolidation of the French, Dutch and Belgian interests. The Midwest Oil Co., financed by Colorado and Eastern men, is a close second. These companies own the two refineries.

The Wyoming Oil Fields, Ltd., owns 20 producing wells in the Shannon field, six miles north of the Salt Creek field. The oil from this field, a lubricant, contains 12% kerosene, 87 lubricating oils, and 1% paraffin. The Midwest company reports that it will drill 40 wells during the present summer, the Wyoming Oil Fields 30 wells, various smaller companies from one to two wells each. An area 4 by 13 miles is reported as proven.

The use of sodium oxalate is recommended by the Bureau of Standards for standardizing permanganate solution (*Journ. Am. Chem. Soc., April,* 1912), as being readily prepared, stable, and readily tested for purity.

*State geologist, Cheyenne, Wyo.

The Evolution of the Cableway

By Henry M. Payne*

A careful study of traveling cableways, in the libraries and patent offices of both Europe and America, reveals six distinct stages in their evolution.

Six stages are noted in the evolution of the traveling cableway. The features of the first were vertical towers with fixed anchors; of the second, yielding anchors; of the third, towers and anchor cars built as units; of the fourth and fifth, inclined front or working legs and the ballast directly under point of tower; the sixth or latest type uses suspended counterweights and inclined oscillating sheers pivoted at lower ends.

*Mining engineer, Stephen T. Williams & Staff, 346 Broadway, New York.

Early Type of Cableway

One of the first cableways to be erected in this country was installed for use in the construction of the Chicago drainage canal in 1893. This is illustrated in Fig. 1, and consists of two heavily constructed timber towers, standing plumb, built over many car-wheel trucks, mounted on four standard-gage track rails each. The anchor cars or traveling deadmen, H_1 and H_2 were similarly constructed.

Anchor car H_1 was loaded with closely piled limestone 12x30x5 ft., weighing 2 tons per cubic yard piled, or a total weight of about 133 tons, plus the weight of the car. Anchor car H_2 had mounted upon it the boiler and engine for operating a haulage system, and sufficient limestone to equal the weight of anchor car H_1.

A 2-in. common steel cable with a breaking strain of 124 tons passed over well lubricated, end-grained, hard-wood saddle blocks at the points *GG*, in the tower tops, to the anchor cars. This cable was put in place at a given catenary indicated by the line *DD*, assuming that the deflection at *AA* allowed an adequate safe factor for loads.

A comparison of the breaking strain of the cable and the weight of the anchor cars or deadmen, readily shows the intended rigidity of this design, and that the whole structure was to have no other movement than its lateral travel on the rails.

The action of the cable under these conditions was such, due to the deflection *AA*, that it was found impossible to approach near enough to the tail towers to excavate the material at *F*, and with the load at the point *B*, the deflection was approximately the same as when at *A*, forming a grade in the cable of about 35°, which bend was also disastrous to the life of the cable. Similar difficulty was experienced at the opposite end, thereby preventing sufficient clearance for the spoil bank or storage pile.

The total weight of the anchors being far in excess of the ultimate breaking strain of the cable, it became necessary on account of the short life of the cable, to redesign the whole cableway.

Weight on Anchor Cars Reduced

Fig. 2 shows the result. The pile of limestone on the anchor car H_1 was reduced to 3 ft. in height, making the weight about 80 tons instead of 133. A corresponding decrease was made from the anchor car H_2, thus reducing the cost of track construction and permitting greater facility in moving the towers.

Under the same working conditions as in Fig. 1, the deflection at *AA* is the same, but instead of rigidity, we have the yielding of the anchor car, as indicated by the dotted lines at H_1, when the cable is under load. The anchor car ceases to be a deadman and becomes a balance weight, making it possible to carry the load to the towers, for as the load approaches the tower, the balance weight H_1, falling, picks up the cable and load, thereby reducing the grade to approximately zero, as may be noted by the deflections at *B*, and the relative grades of the cable when the load is at *C*.

Tower and Anchor as a Unit

This was a material improvement, but the frequent derailments of the anchor car H_1 made further changes necessary, as shown in Fig. 3, where the tower and anchor car are built as a unit, and the front or working legs of the tower are given a greater angle, while the back legs are placed nearly vertical. The anchorage is also moved in, obviating the use of the heavy ballast under the track at H_1.

From all these changes there may be deduced six conclusions: (1) That the cable support is no longer a fixed point, or fulcrum, but a lever. (2) That the yielding of the structure is a balance to the load, or work done; a "relief valve" to the strain on both cable and towers. (3) The increased angle in the front legs of the tower more nearly approaches the resultant of the forces, or the line of compression. (4) The nearly vertical position of the back legs removes all compression and changes them into tension members. (5) The ballast pile of limestone has been moved in and materially reduced in weight. (6) The tower and car combined form a simple gravity anchor.

In this form of construction, with yielding tower, the fulcrum is the inner track rail at *F*, the initial cost for towers, track, rails, grading, moving, etc., is less, and the available storage space is increased.

About the time of the failure of the type shown in Fig. 1, W. F. Brothers of Philadelphia took out letters patent on the balanced cableway shown in Fig. 6,

The Latest Type of Cableway, the Balanced Cable Crane

toward which it is evident that all these later types were tending.

Front Legs of Tower Inclined

In Fig. 4, the action of the cable is comparatively the same, but we find radical changes in the towers. The front legs were given a still greater angle, approximating the resultant of the forces, and the ballast brought in to its most efficient position, directly under the point of the tower. The wheel base is also cut down to five tracks, from the original eight in Fig. 1, the rock ballast is eliminated except under the front rail, and although the towers are lighter, the factor of safety is in excess, and the load capacity is more than doubled.

It is of interest to note that the best

cableway record up to 1893, with the type shown in Fig. 1, was made by the installation on the Chicago drainage canal, noted above. This required eight standard rails for each tower, covering 103 ft. of ground space, with a span less than 500 ft. in length, the tower and ballast at each end weighing in excess of 200 tons. The best day's work was 150 cu.yd., and the life of the whole installation was less than 1000 cubic yards.

Today we find at work on the great Gatun locks at Panama 26 towers, of the type shown in Fig. 5, working 13 cable-

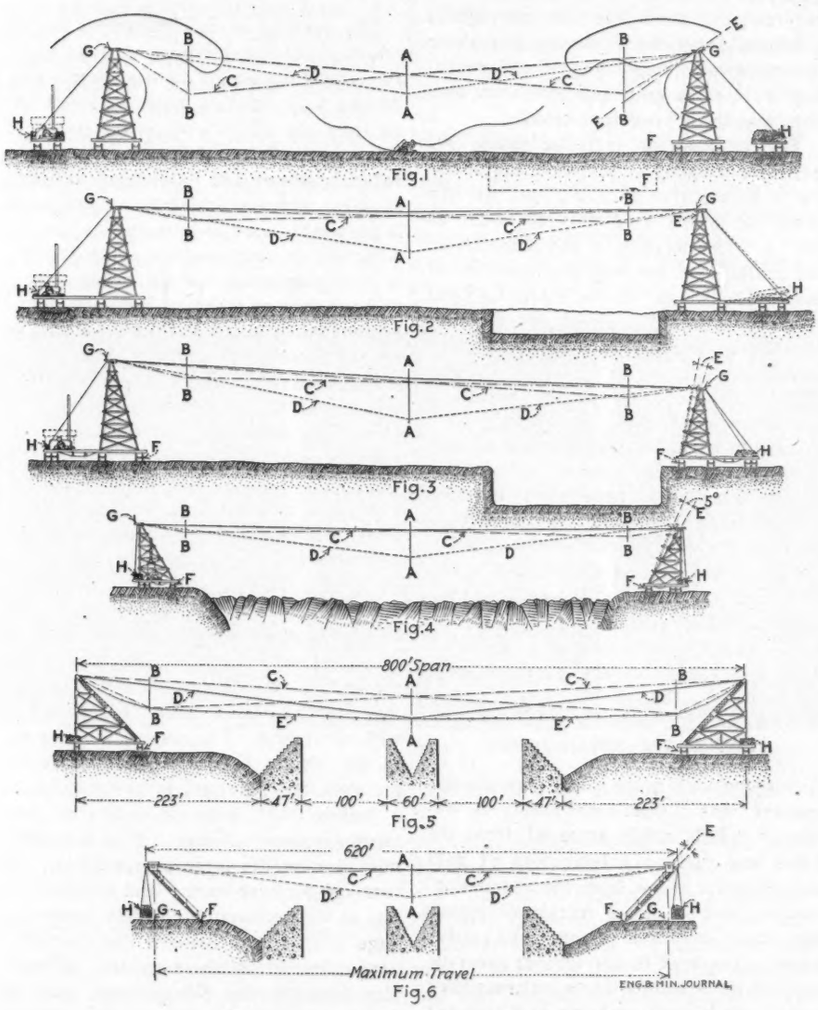


DIAGRAM SHOWING THE EVOLUTION OF THE CABLEWAY

ways, and occupying less than 60 ft. of ground space each. The total weight of each tower and ballast is about 50 tons. They have a working span of about 800 ft., and a daily capacity of 1000 tons each, while the life of the cables is in excess of one year. In 1893, 1000 tons per cable, with a 500-ft. span; in 1912, 300,000 tons per cable, with more than an 800-ft. span!

Fig. 6, which represents the latest type of balanced cable-crane, has suspended counterweights, taking the place of fixed anchors, with inclined oscillating towers or shears, pivoted at the lower end. The weight of the cable and car, with its load, is thus automatically maintained in equilibrium. The counterweights eliminate the dead load, reducing the resistance to the rolling car, and permitting a much smaller motor to convey the load. Traveling ropes are eliminated, and all shock is taken up when the skip is raised or dumped. The rope remains practically level at all points in the span, enabling the operator to stop and start at any point under maximum load, and the one motorman raises, conveys and dumps the skips or clam-shell buckets, reducing cost of operation and increasing the safety of the men working underneath, who must otherwise depend upon the transmission of signals.

One of the striking features of this type is its adaptability to storage coal or ore plants, where one of the traveling shears may operate in a circle around the other, being motor driven, and thus covering every point of a given area.

I am indebted to A. P. Man for the following formulas, deduced by him from the balanced cable-crane in operation at his mines in Virginia:

Let S = span; M and N = divisions of S; Y = distance to load on M side; W = weight of 1 ft. of cable; G = load; T = tension; H = deflection. Then the deflection due to the cable alone, is

$$H = \frac{MNW}{2T}$$

at center

$$H = \frac{WS^2}{8T}$$

and the deflection due to load alone, is

$$H = \frac{GNY}{TS}$$

at center

$$H = \frac{GS}{4T}$$

and the total deflection is

$$H = \frac{WMNS + 2GNY}{2TS}$$

at center

$$H = \frac{WS^2 + 2GS}{8T}$$

Example: Where $W = 6.12$, $S = 525$ ft., and $T = 66{,}000$ pounds.

$$H = \frac{6.12 \times 275{,}625}{8 \times 66{,}000} = 3.2 \text{ ft.}$$

The balanced cable-crane type was used at Hale's Bar, Tenn., in the construction of the great dam there, and in various other heavy pieces of construction in New York and elsewhere. A typical installation is shown in the accompanying halftone. The same apparatus was used in the erection of the bridge over the gorge of the Zambesi River, in Africa. This bridge had a clear span of 870 ft., and its deck was 460 ft. above the river. The one balanced cable-crane in use brought steel to gangs at both ends of the bridge, and also put over all the material for the railroad, making it possible to complete over 100 miles inland before the bridge was in use.

The Vicissitudes of Graphite Mining

Concerning graphite mining, a recent bulletin of the U. S. Geological Survey makes the following statements: "Today there are more abandoned graphite mines and mills in the United States than there are in operation. The number of times that some of these properties have changed hands in the course of a few years evinces a record of misrepresentation and disappointment that can hardly be equalled in any other branch of mining. . . . It should be clearly understood by anyone who contemplates the development of one of the flake-graphite deposits that the technology of concentrating such materials is yet in its infancy;

that there are no well established systems of treating the materials, such as exist, for example, for the treatment of gold or copper ores; and that the product obtained is variable in quality and in market value and subject to severe competition with foreign graphite. The largest part of the foreign graphite that comes into this country is brought in by American firms who either control or own the foreign mines or have purchasing agents abroad, and are, therefore, in a position to take immediate advantage of any change in the markets at home or abroad. In general, the cost of producing flake graphite is so high and the price at which it is sold so low that even under the most economic conditions the margin of profit is small. Moreover, certain rocks that carry graphite contain other minerals which preclude any possibility of successful concentration—such, for example, are rocks in which graphite flakes are interleaved with mica—and a careful study of the material by an expert should precede any attempt at development."

The Assay for Gold, Silver and Platinum*

The assay formerly carried out for determining the fineness of gold alloy to one-tenth of one-thousandth part has had to undergo an amplification, by the additional determination of platinum, as this metal has increased in value and found extensive industrial use.

Its exact determination has caused considerable difficulties. Platinum alloys require a high temperature for cupelling, which causes large losses of precious metals, moreover, the bead obtained contains lead and is friable. When alloyed with silver the platinum dissolves in nitric acid with a brown color, but usually incompletely; the residue breaks up into fine powder which cannot be readily collected and which does not frit together when annealed.

Below, a scheme will be given which allows the platinum content to be determined within 5 one-thousandths or less according to the accuracy and skill of the operator.[1]

Preliminary Assay Run First.

As a unit of weight for alloys containing more than 250 one-thousandths gold plus platinum, one-half gram is taken; for alloys with less than 250 thousandths, one gram; for preliminary assay 500 mg. of the sample[2], which has been reduced to convenient shape by hammering or rolling, or more correctly, by granulation, are cupelled in the muffle at a temperature of 900 to 950° C. with a quantity of lead that must be increased with the amount of base metals in the alloy, that is to say from three to fifteen grams of lead. The bead obtained always retains traces of base metal, principally lead. This retained lead increases with high-platinum contents to such a degree that sometimes the bead will weigh more than the sample originally weighed up. From the more or less gray, flat and rough appearance of the bead one may be able to judge of the approximate amount of gold plus platinum. It is safer, however, to treat the bead like the subsequent synthetic assay, by dissolving the silver in concentrated sulphuric acid and weighing the residue gold and platinum, thus obtaining the approximate assay.

For the main or synthetic assay, 500 parts are weighed in duplicate and chemically pure silver is added so that the silver is to the gold plus platinum as 10 : 1. This mixture is now cupelled in the muffle with the requisite quantity of lead. The weight of the resulting bead less that of the fine silver added represents the original gold-platinum-silver content.

The loss of silver in the cupelling operation which may amount to from five to 35 parts by weight depends upon the temperature, the quantity of lead added, the duration of cupellation, the kind of cupel used, the amount of silver present and the composition of the alloy. It can be determined by trial with a series of alloys of different composition, but more accurate results are obtained by simultaneous cupellation of a proof of approximotely the same composition at the sample.

High Silver Advantageous

Alloying with much silver has the advantage that a lead-free button is obtained[3] that is easily removed from the cupel and that no notable loss of gold and platinum arises from the cupellation, for the loss of these metals decreases with the increased amount of silver added. The bead is put without previous hammering or rolling into a mattrass such as is used in gold assaying and digested with about 25 c.c. concentrated H_2SO_4, sp. gr. 1.84, over a circular gas burner.

The acid is heated without boiling, to avoid local overheating, and effects solution of the silver in 25 or 30 min. The residue of gold-platinum with its surcharge of silver then remains in one piece, which precludes mechanical losses in the subsequent decanting of the solution. Heating the acid to the boiling point causes disagreeable bumping without effecting a perfect solution of the silver, even on replenishing the acid; furthermore platinum is notably soluble in boiling concentrated H_2SO_4, and is then lost. After brief cooling the solution is carefully decanted and the residue is washed with hot water. It is advisable to pass the water through a filter. Now fill the mattrass with distilled water and turn it upside down in an annealing cup or porcelain crucible; the residue will sink to the bottom of the latter. It is gently ignited with the filter in the forepart of the muffle.

Reduce Gold with Hydrazine Chloride

The residue is now dissolved in the smallest possible quantity of *aqua regia*, the largest portion of the acid evaporated, diluted with distilled water to about 150 c.c. and the chloride of silver produced filtered off. In consequence of its strong reducing power and its convenient applicability, hydrated chloride of hydrazine is preferably used in reducing Au and Pt. Although it often carries some Pt with it in precipitating the Au, when proper precautions are taken its reducing power is diminished by an addition of HCl and lowering the temperature. The Au is precipitated from the solution after the addition of 15 c.c. HCl of sp.gr. 1.10, by about one gram of hydrazine chloride, and the solution is left standing at 18 or 20° C. for an hour with occasional stirring so that the precipitated gold will unite. After filtering, incineration of the filter and ignition the gold is ready to be weighed. This gold—often somewhat platiniferous—is cupelled in the muffle with a small quantity of lead and five to six times its weight of fine silver and, thereafter, the silver and any platinum that may be present dissolved by boiling with nitric acid. The residue is fine gold. In the filtrate from the precipitation of the gold the platinum is precipitated at a boiling heat, with an excess of ammonia, in about 10 min. With low-platinum content the large excess of HCl is removed by evaporation and gentle boiling, as the ammonium chloride formed in large excess, will prevent the precipitation of the Pt by the formation of complex ions, or the precipitation may be done by caustic potash and ammonia in which case the filter must be washed thoroughly with hot water acidulated with HCl. The examination of ores and metallic wastes for silver-gold-platinum is made by scorification or crucible assay with subsequent treatment of the resulting lead button in the manner indicated above.

*Translation by O. H. Hahn, of an article by Trenkner, assistant to the master of the mint, at Berlin, Germany.

[1]The French limit is 10 one-thousandths.

[2]Most platinum fusions are made by adding silver to them in order to obtain a more homogeneous and fusible alloy.

[3]Sharwood, Cupellation of Platinum Alloys. Journ. Soc. Chem. Ind., Vol. XXIII, No. 8.

It is reported that a lead smeltery is being erected at Martinschizza, near Fiume, Austria, to treat ore from Broken Hill, Australia. The ore will be landed at the port of Buccari.

The Sizing of Fine Dry Ore

By Charles H. Brown*

In machines of the Vibromotor type for sizing dry ore, fine-mesh wire and silk screens are used, mounted on shaking or gyrating frames. This article describes the operating difficulties experienced and how they were overcome.

*General manager, Machine, Automobile & Construction Co., Magdalena, N. M.

In the sizing of crushed ore by machines of the "Vibromotor" type, in which a series of discharging screens is used, there are many factors that affect the capacity of the machine and the cost of upkeep to a much greater degree than might be anticipated.

It will be my purpose in this article to explain the reasons why difficulties arise and their remedy, rather than to deal with the cost of sizing. My remarks are intended to suggest ways of reducing expenses to those already operating these machines rather than to furnish data for contemplated installations. In other words, I hope to enable some fellow operator to avoid the duplication of some of my unpleasant experiences in using this type of machine while engaged as superintendent of the milling department of the Ozark Smelting & Refining Co., at Magdalena, N. M. This article is not to be regarded as a criticism of this type of machine, for there is no doubt that many problems of ore sizing may be solved by its use.

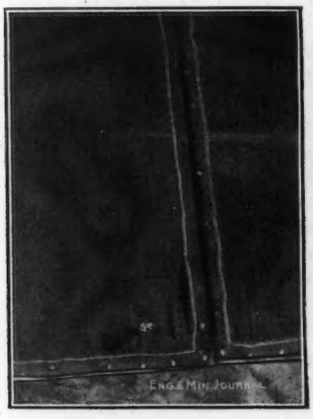


FIG. 1

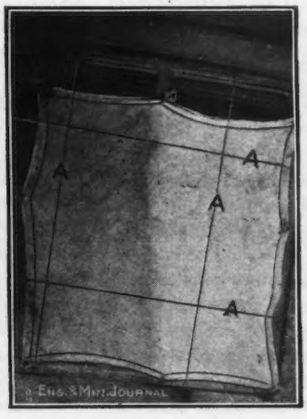


FIG. 2

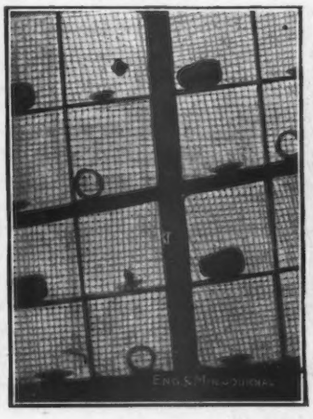


FIG. 3

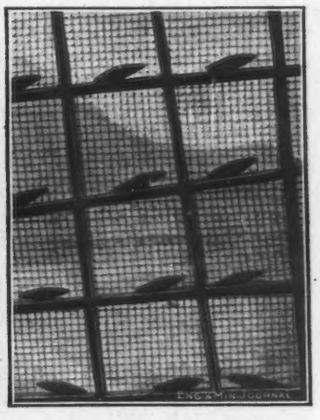


FIG. 4

VIBROMOTOR SCREENS AND RING, BRUSH AND RUBBER SCREEN BEATERS

CHARACTER OF PULP AFFECTS CAPACITY

Among the more important factors that may influence the successful sizing of ore may be named:

(1) The character of the ore; whether in general composition it consists of carbonates, sulphides, or mixtures, and particularly the constituents of the gangue, whether they be quartz, limestone, magnetite, or either massive or specular hematite.

(2) The fineness to which it is necessary to crush the ore in order to free the mineral, also whether the valuable minerals are associated with the harder or the more easily crushed constituents of the ore.

(3) The quantity of very fine material contained in the ore as received from the mine, and the quantity of fines made in crushing.

(4) The complexity of the ore in regard to the separation of the constituent minerals and whether or not a suitable process can be developed for treating the slime portion and to what extent the sizing must be carried to leave the very fine material capable of treatment.

As the rate of feeding affects the capacity and efficiency of the machine, one of the first requisites is to determine the maximum rate of feed that the machine will take without sending undersize particles into coarser sizes. The screens must not be so heavily loaded that they cannot properly agitate the ore over their surfaces so that the undersize can pass through. If a screen is overloaded the lighter particles of ore may float on top and be carried to the discharge instead of passing through the screen; or the corner of an oversize particle may be forced through the aperture by the weight of the particles on top of it.

It may be well here to regard the manner in which ore passes over a screen. When particles of different sizes but of the same specific gravity are agitated together the larger pieces rise to the top. When particles of the same size but of different specific gravity are agitated together the particles of low specific gravity rise. In sizing ore as it comes from the grinding machinery the pulp consists of a mixture of particles of the same size and different specific gravity and those of different sizes and the same specific gravity, hence crowding the machine would result in bad sizing. This crowding also causes blinded screens from wedged particles, and broken screens from overload and excessive wear on the threads or wires necessitating frequent renewal of the screens attended by loss of time to clear and repair them.

The maximum practical capacity of a screen is obtained when the gyrations of the ore are so free that each particle has ample opportunity to have its smallest dimension turned toward the aperture. It must be borne in mind that sizing ore consists of passing the small particles through the screen. If the sectional area exposed to the separating medium in concentration, of any particle is greater compared with its volume, than that of the other particles in the product, the product containing such particles is really unsized and is liable to cause trouble in table concentration. It is frequently noted in concentrating iron and zinc sulphides, that the pyrite, although of greater specific gravity, often breaks into thin particles, and passes off the screens into a product consisting of particles of sphalerite of the same sectional area as the original unbroken particles of pyrite but of greater specific gravity. Naturally when it comes to dry concentrating on tables, the pyrite is floated into the zinc. It is sometimes impossible, of course, to operate a machine so that this splitting up of the particles can be overcome.

Screens Must be Tightly Stretched

Well stretched screens play a most important part both in regard to the capacity and the efficiency of mechanical classifying apparatus. It is impossible to do good work with bagged screens, for as the surfaces of the screen tend to form dish-shaped places, the ore collects so deeply that the gyrations of the machine cannot properly agitate it; the excessive weight forces oversize through the screen, and the screen can not readily pass its load to the next one, or discharge it. It is this condition more than any other, except leakage at the bottom joints of the doors, that causes slimes to come over in the sizes. By well stretched screens is meant not only screens stretched tightly, but stretched so that the aperture is left rectangular. Enough tacks must be used at the edges, so that when the load is on the screen its weight will not pull the rows of meshes into a wavy line at the edge of the frame. The spacing of tacks to hold screens tight will vary from one inch centers single row 6-oz. tacks on 18-mesh to ⅜-in. tacks on 60-mesh light-tinned wire cloth.

The crushed ore should be warm, a temperature of 100° F. to 150° F. is good. I have seen well-stretched screens, well cleaned and with a moderate feed, that after operating four hours on cold dry pulp, would be almost completely blinded to as coarse as 28-mesh particles and I have seen particles as coarse as 34-mesh coated over with slimes as smoothly as if they had been painted. Of course with silk screens it is necessary to guard against a temperature that would injure the cloth.

The question of the removing, cleaning, and replacing screens, without damaging them, and with a certainty of replacing them in the place they belong, with a minimum loss of time to the machine, is of no small importance. When it is remembered that the material from which the silk screens are made costs from $1.75 per yard for 4XX (approximately 75 mesh) to $7 per yard for No. 25 standard (approximately 200 mesh) for cloth 40 in. wide and that although this fine-mesh cloth will stand a surprising amount of wear with good treatment, it is easily torn by careless handling, the importance of avoiding accidents to the screen is apparent.

Screen Frames Must be Carefully Handled

The best way to remove the screens from the machine for cleaning, is to use two pairs of 12-in. gas pliers, the handles of which have been bent at the end to afford a good grip. The screen frame at each side is gripped, care being taken to get hold of the sides of the frame instead of the end, then by a good stiff pull the frame is usually readily removed. The frame cannot wedge because the force is exerted at the same instant at each side. This manner of removing frames avoids the almost invariable result of shoving the thumbs through the screen, or of torn fingers, when removing the frames by hand.

The cleaning of silk screens is best done with an ordinary short-bristle scrub-brush made of manila fiber. These brushes are excellent for cleaning wire screens if the ore is not wedged into the apertures. In case that the ore is wedged badly we have found that a pressed-tin lid, like those used on baking-powder cans, used with circular edge next to the screen will more readily remove the wedged particles than any other means, and with practically no damage to the screen if care is exercised. The thin edge catches the particle and pulls it up out of the aperture instead of shoving it through.

Much care must be exercised in the cleaning of fine wire screens by any method so that they will not be bagged by stretching the wire in bearing too hard on the screen. Any screen that becomes badly bagged had better be restretched or replaced at once.

Mistakes in Replacing Screens Must be Avoided

The replacing of screens in the machine without having a system of marks to go by, is a most exasperating task. It is usually necessary to employ some unskilled labor for helping clean and replace screens, unless there is a complete set of extra screens so that no cleaning need be done until after the machine is started. In replacing sizer screens it is ridiculous to try to judge each size by the eye. As it is necessary to get the machine in running order in as short a time as possible a green hand is apt to shove some screens into the machine whether he knows where they go or not.

One satisfactory system of identifying the screens is to use a series of small brass tags with the screen numbers plainly stamped on them. One of these tags is let into and firmly tacked to the outer edge of the left corner of the frame and just above where the frame slides when being removed from the machine, a corresponding number is cut or stamped on the jamb of the machine. This method permits of checking the screens after they are put in.

Another way to readily identify screens, and one that I have used with good results, is a system of colors. In this arrangement only such colors of paint are used as will be in marked contrast to the others. The under edge of the outside end of each screen frame is painted with a color corresponding to a given mesh. The number of this mesh is cut or stamped with large dies into the jamb of the machine at the left edge of the screen, and a stripe about 1½ in. wide is painted across the jamb, corresponding to the color of the screen frame. In case the screen is a discharge for that product the stripe of the jamb has a white border about ⅛ in. wide painted around it.

In the room where the screens are repaired, a color board, with the number of each corresponding screen marked opposite the color, is hung so that the repair man may constantly refer to it. In this way each worn-out screen is immediately replaced by a new one of the same mesh. Right here let me say that some manufacturers and dealers in wire screens make a practice of sending out screen cloth cut to size, with a number of meshes in a single bundle with perhaps part of them stamped or tagged and possibly none of them with tags. This practice is occasionally annoying, as everyone knows who has had to deal with it, as frequently the repair man will put the wrong screen on a frame, which means that if the system of screen arrangement is adhered to the screen must be removed from the frame, in which operation, if the screen be of fine mesh, it is often seriously damaged. Screens are expensive and dealers should see to it that each one is plainly marked or tagged before being bundled for shipment.

Marking the Screen Frames

Screen frames should, if possible, be painted before they are used, and the surface on the jamb of the machine that is to be stamped and striped should be thoroughly cleaned with gasoline. We use paints made by the Sherwin-Williams Co., as we have found the colors very bright, the paint sinks well into the wood and dries readily, leaving a glossy surface that sheds the dirt. The blank frames are not painted, neither is the jamb, but the letter *B* is cut into them.

In case a large number of sizes are being made, it is better to run the colors so that those that are used in the wire screens may be repeated in the fine silks. This enables one to employ only such colors as are readily distinguished and the operators are not liable to put a silk screen in the place of a wire one after once having become acquainted with the system. The number is put on the jamb of the machine in connection with the color in order to more readily refer to the size and to increase the knowledge of the men. After the screens are in, the man in charge can run down the left-hand corners, comparing the colors of the screens, and sizer jambs and at the same time touching each screen with the ends of his fingers detect any mistake at once.

The repairing and renewing of screens has formed a distinct line of thought for every man who has undertaken to operate, in an economical way, a ma-

chine of this type. Naturally everyone learns some valuable things from his experience and probably some of the readers of the JOURNAL will have some points far in advance of those given here—if so let's have them. These conclusions and observations have, however, only been arrived at after many experiments and trials.

SILK SCREENS REQUIRE SUPPORTING WIRES

The most serious trouble that we have experienced from wire screens was caused by bagging in the sizes ranging from 20 to 34 mesh and by bagging under the load and from blinding in the sizes ranging from 34 to 50 mesh. In the silk screens trouble arose from wear and breaking from the load, which breaking was indirectly caused from the length of the span being too great for the strength of the cloth after it had become a little worn; by imperfect stretching of the screen when mounting; by the spacing of the tacks being too great; and by the short inside edge of the frame coming in contact with the screen cloth when the screen was loaded. This sharp edge forms the shoulder against which the ore strikes when thrown by the motion of the machine. The inside edge of the frame may be beveled at 45° so that the selvage will do the bending and take this wear, thus doing away with the sharp edge. In Fig. 1, is shown a photograph of a screen that "died from a complication of diseases." The break at the corner was induced by improper stretching and probably by overload. The split at the side was caused from wear on the corner of the frame. The tacks are spaced too far apart. The frame is of the step variety, which type of frame tends to pile the ore up on the lower screen next to the partition, and the lower part of the screen is usually worn and broken long before the rest of it needs replacing. This type of frame has been found unsatisfactory for our use

In Fig. 2 is shown the manner in which we avoided breakage in silk screens from too great a span and the bagging of wire screens from the same cause. The lines *A-A-A-A* on the photograph represents strands of piano wire stretched across the frame, so that the screen is divided into 16 areas having supports at all sides instead of four areas. The sizes of piano wire used are the gages corresponding to No. 22 B & S for wire screens, and No. 26 for silk.

These wires were each mounted separately, being fastened at the ends to 3-d. nails driven into the frame with the points slanted outwardly. The nails are driven in until the wires "sing." The reason piano wire is used is that it does not give trouble from stretching, and is free from flaws. The screens gave us no trouble from cutting where they rested on the wires, the brushes were able to work right up to the wires, and there was little tendency to blind along the wire. The advantages in preventing sag and broken screens are apparent.

RUBBER BEATERS USED ON THE SHAKING SCREENS

We had another condition that caused us some concern. Our ore had to be crushed so that half of it would pass through 50 mesh. This threw a heavy load on the next screen which was 4XX silk (approximately 75 mesh.) These silk screens, owing to the excessive wear and strain put upon them, gave us much trouble and incidentally about one-third of our total sizer expense. In order to overcome this we instituted a series of experiments on the use of wire screens of this aperture. We found that 60-mesh wire on this ore with the ordinary arrangement would blind in a few hours, and so we modified the screen frames, and tried out different types of brushes, singly, in pairs and in combination with each other. Fig. 3 is a photograph showing one of these especially arranged frames, with different types of brushes arranged so as to show conclusively which would do the best work. In Fig. 4 is shown a partial view of the arrangement adopted from this series of tests. The extra partitions shown are wedge shaped in cross-section and are only ¼ in. wide at the top. The edges of the upper surfaces are rounded.

The rubber cone beaters shown in Fig. 4 were found much preferable to either of the other types of brushes shown in Fig. 3, for this fine wire screen. The sole-leather carrier with its knob on the bottom and the two small tufts of bristles at one end gave fair results, but the round rings were almost useless. The serious objection to the rubber beaters is that they wear rapidly, but it was found that they would have their portion of the fine wire screen practically clean when the tuft brush would be getting badly behind with its work and the screen over the ring brush would be almost blind.

Tharsis Sulphur & Copper Co.

The report of the Tharsis company, operating in the Huelva district in Spain, shows a total copper-ore production of 327,348 tons, exclusive of 5420 tons of the so called "cupreous sterile," treated at the mines. Copper precipitate shipped from the mines amounted to 2249 tons, while pyrites and washed-ore shipments were 477,364 tons. The total refined copper produced at the English works amounted to 3393 tons, a decrease of 101 tons from the 1910 figures.

Of the total assets of the company (£1,642,478), no less than £1,106,183 is in securities and cash. The company is attempting to reinvest this in other mining properties, as already noted in the JOURNAL, but so far has found no property suitable to its requirements.

Prospecting for Asbestos

The following hints on prospecting for asbestos are offered by the U. S. Geological Survey (*Bull.* 470-K). Asbestos occurs only in ancient crystalline rocks of Paleozoic or earlier age, and the rocks in which it is found are almost invariably of igneous origin, peridotite altered to serpentine being by far the most important. The conditions most important to observe are purity of the serpentine, its flexures and the presence of granite. The purer the serpentine the more likely it is to form asbestos, while the more abundant the fractures, especially if the serpentine be intruded by granite, the more likely it is that the circulating magmatic waters will form asbestos.

There are three types of asbestos fiber: Cross, slip, and mass fibers. Cross-fiber asbestos occurs in veins and the fibers, if undisturbed, run directly from wall to wall. Slip fiber occurs in slipping planes, the direction of the parallel fibers in the plane indicating the direction of slipping. If the slipping is extensive the shear zone or fault plane may have a mass of slip fiber a foot or more in thickness and many feet in length and breadth, forming a definite vein deposit of considerable size. Mass fiber occurs in fibrous bundles or groups and the fiber may be parallel or divergent. It is strongly contrasted with the cross-fiber and slip-fiber types in that it does not occur in veins but forms the whole mass of the rock in which it is developed.

There are four modes of occurence of asbestos in the United States. The first is as cross-fiber veins of chrysotile in serpentine derived from peridotite, a deep-seated igneous rock, at Lowell, Vt., and Casper, Wyo. So far as known, it is the most important mode of occurrence and is well illustrated at the Thetford mines in Canada. A second mode is a cross-fiber vein of chrysotile with serpentine in limestone. Its most important illustration is in the Grand Cañon of the Colorado in Arizona. The third mode of occurrence is as mass-fiber amphibole (anthophyllite), composing stocks and dikes of fibrous amphybolite, and is well illustrated in the deposits worked for many years at Sall Mountain, Ga. Asbestos of this mode has recently been opened and has attained some importance at Kamiah, Ida. The fourth mode is slip-fiber veins in rocks which, for the most part, are cortlandite and pyroxenite, but which locally pass into peridotite, as at Bedford and Rocky Mount, Va. Commercial asbestos has been found in the first and third modes of occurrence only. Attempts have been made, but unsuccessfully, to mine asbestos of the second and fourth modes of occurrence.

Dominion Steel Corporation

The annual meeting of the Dominion Steel Corporation was held at Montreal, June 12. President J. H. Plummer, in his annual adress, complained of the action of the Canadian government in refusing to renew the bounties on wirerods, which, he said, had been a distinct disappointment to the company, as it had expected a renewal of the bounty pending an investigation by the Tariff Commission. He contended that the steel business had been treated unfairly in being refused a higher degree of protection. Canada imported yearly about 1,000,000 tons of iron and steel at an expenditure of $25,000,000. If this were manufactured at home, from $16,000,000 to $18,000,000 of this amount would go to Canadian workingmen. Reviewing the year's business, Mr. Plummer pointed out that the steel department has suffered in common with American steel companies, owing to lower prices and smaller demand, but indications pointed to a revival in business. The position would be helped by the completion of the finishing mill and other improvements. The coal output at present was larger than at any time in the company's history, and the earnings of this branch last year had been most satisfactory. Since Apr. 1, 1912, the output was 192,000 tons ahead of the same period last year. A dividend of 4% was announced, the president stating that if it were not that the company looked forward to the removal of some depressing factor, it would not continue to pay this dividend on the common stock. The financial statement presented, covering the period of 21 months, from July 1, 1910, to Mar. 31, 1912, showed surplus after the payment of dividends amounting to $1,484,945, of which $700,000 was set apart as a special appropriation for depreciation and renewals, leaving a net surplus of $784,945.

The increase in output came up to expectations, the figures for two fiscal years ending Mar. 31 being as follows, in tons:

Coal Co.	1910–11	1911–12
Cape Breton collieries	3,752,298	4,063,395
Cumberland collieries	109,863	342,868
Total coal	3,862,161	4,406,263
Steel Co.		
Wabana ore	544,792	602,168
Pig iron	248,715	290,588
Steel ingots	301,940	335,553
Rails	133,896	153,498
Wirerods	18,600	70,633
Blooms and billets	34,110	43,950

During the year the amount expended on new collieries and other property of the coal company, in Cape Breton, amounted to $1,576,931, and on the Cumberland property to $23,353. The operations at all the collieries have been carried on steadily and satisfactorily. The new mines in the Lingan district are making an excellent showing in tonnage and quality, the coal from No. 6 colliery having greatly improved at depth. Expenditures on capital account on the Dominion Iron & Steel Co. amounted to $2,714,539, in addition to which $1,400,000 was paid on account of the purchase money for Dominion Coal stock. The former board of directors was reëlected.

Cuyuna Iron Ores

SPECIAL CORRESPONDENCE

Data concerning the grade of Cuyuna Range ores in Minnesota are now available from the records of the developed mines and from the logs of more than 2500 drill holes. Most of the ore so far developed is nonbessemer in character and there is little reason to expect that the district will become an important contributor to the bessemer-ore supply. The Cuyuna ore is generally a hydrous, siliceous limonite with a mixture of hematite, and some fairly large bodies of hematite, especially on the north range. Only a little of the developed ore contains over 60% iron, and according to a calculation made by a local engineer, a determination of all of the ore containing over 40% iron would show an average of about 45%. This is an approximation of the low grade of the ore. The commercial minimum in the district is accepted at 51.30% iron for the nonbessemer standard. Much of the ore above 45% and below the standard can be utilized in operation by mixing with grades above the minimum. How much of this below-standard ore will be available in this way depends somewhat on mining conditions. Another calculation on the grade of the ore shows that on the basis of the development up to 1912, an estimate of the average iron content of the developed ore analyzing over 50% iron shows an average iron content of about 53%. A small amount of magnetite is found in the orebodies. The extensive magnetite-bearing schist which accompanies the orebodies is not now of commercial interest.

Iron Content Decreases With Depth

The highest-grade ore has generally been found nearest the erosion surface and the iron content decreases with depth, the limit of commercial ore being about 200 ft. on the south range and from 300 to 450 ft. on the north range. The deepest ore disclosed so far is 850 ft. on the north range. These depths, of course, are based on the datum of the erosion surface, not on the actual surface of the overburden which is everywhere from 50 to 306 ft. deep. In depth the ore grades abruptly into iron carbonate and other ferruginous material, the evident primary source of the orebodies. The phosphorous content is estimated to average about 0.30% although it varies from 0.04% to 0.60% or more. Notwithstanding the intimate relation of the slate to the orebodies the ore is relatively low in alumina and does not average above the iron ores of the other Lake Superior districts. Considerable silica is found in all of the ore, the silica content having a constant inverse relation to the iron.

The moisture content of the Cuyuna ores varies from 6 to 14%. An average moisture standard is 10%. This relatively high percentage is due perhaps to the orebodies having formed reservoirs so that the ore is physically saturated in the ground. With the development of underground mining and the drainage of the orebodies, this moisture content will probably be materially reduced. Portions of the Cuyuna deposits are highly manganiferous, yielding up to 25% manganese and averaging in large bodies 15%. The marketing of this product is engaging the interest of some operators. Under present trade conditions there is practically no demand for this manganiferous-iron ore. The Cuyuna ores, though sometimes soft and earthy, are generally hard and porous and the ore from the district receives a classification as "old range" on account of this physical structure, which gives it a preferential price of 20c. per ton over the Mesabi ores. It is likely that under special conditions bodies of higher-grade ore, possibly of bessemer grade will be disclosed in the district as development proceeds.

Mt. Lyell Mining & Railway Co.

The report of the Mt. Lyell Mining & Railway Co., of Tasmania, for the half year ended Mar. 31, 1912, shows operations greatly hindered by strikes. Only 1500 tons of blister were produced (as against 3841 in the half year preceding), carrying 1482 tons of copper, 102,454 oz. of silver, and 1858 oz. of gold. Ore reserves now stand as follows: Mt. Lyell mine, 2,457,429 tons, carrying 0.532% Cu, 1.96 oz. Ag, and 0.028 oz. Au; North Mt. Lyell, 998,457 tons, carrying 6.0% Cu, 1.33 oz. Ag, and 0.005 oz. Au.

A hydro-electric installation is to be put in at Lake Margaret, seven miles away, and the steam plant at the smelting works thrown out of commission. To provide funds for this and other expenditures, 100,000 shares are to be issued at 25s. per share, or 25% premium. Owing to the strikes, profits for the half year amounted to only 1.7%, or £20,523.

New Jersey's Zinc Production

The New Jersey Zinc Co. treated 306,168 tons of ore at its concentrating plant, and shipped 67,896 tons of crude ore to the smelters in 1911, according to the U. S. Geological Survey.

Determination of Carbon in Steel

By W. L. Morrison*

A rapid method based on the direct combustion of the sample in an electric furnace, and the absorption of the evolved CO_2 in a bulb resting constantly on a scale pan. The time of determination is four to six minutes.

*Chief chemist, Simonds Manufacturing Co., Lockport, N. Y.

While carrying on experimental work with an electric furnace, a rapid and accurate method for the determination of carbon in steel was desired. Colorimetric methods were tried and worked fairly well on carbons up to 0.80%, but above that they were unreliable. Even with the low-carbon steels, results often went astray, due to the varying physical condition of the steel.

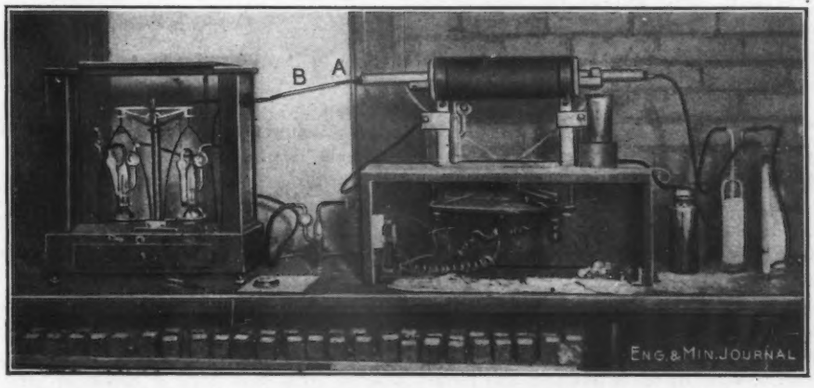
In looking for a better method, I used that described by A. L. Queneau (ENG. AND MIN. JOURN., Mar. 18, 1911; *Met. and Chem. Eng.*, Sept., 1911). In the use of this method I obtained good results, for the crude method that it is. However, results would go low once in a while, due to a lack of the proper precautions. The men in the laboratory were broken in to the use of this method on the preliminary tests from the electric furnace, but after giving it a thorough trial for a month it was considered too unreliable for control work.

I finally turned my attention to the direct combustion of steel in a Haskins furnace as a last resort. The train used for this work is similar to that described by Johnson in his book on chemical analysis of special steels. The oxygen was purified as described, but the CO_2 gas resulting from the combustion of the carbon in the steel was purified and dried in a modified apparatus. A ⅜-in. glass tube, 8 in. long was used. Two-thirds of the tube was filled with calcium chloride and the other third with zinc sponge. The CO_2 passes through the zinc, then through the calcium chloride, shown by *A*, *B*, in the illustration. An analytical balance is included in this train, as also shown.

Too Sensitive Balance Undesirable

The CO_2 is absorbed in a Johnson bulb, resting on the balance pan, the bulb being weighed while the train is aspirating. In connection with this work a cheap balance is better than the more expensive one. Balance No. 2088 (Eimer & Amend's catalog) is the one used. The knife edge on the beam supporting the pan support should not be lifted. The agate plane which rests on the agate-knife edge, should be so constructed that it will not turn with the slight torsion caused by the rubber tube connected to the absorption bulb. This is remedied by the use of the cheaper grade of balance as stated.

A hole is made in the side of the balance case, as near the back as possible, a glass tube of sufficient length to allow rubber connections on both ends, is inserted and fastened, either with a little waterglass or glue. The outer end of the glass is connected to *AB* by rubber connection. A ⅛-in. black, light-wall, rubber tube is connected to the glass tube inside the balance case, the other end of the rubber tubing being connected to the absorption bulb, on the left pan of the balance, as shown in the illustration. A slight drooping of the tube should be allowed, to decrease the friction when weighing. It is important that a pliable rubber tube be used, otherwise the friction is increased and the sensitiveness of the balance decreased. A counterpoise bulb is used on the right pan of the balance. In weighing the absorbed gas it is much easier to weigh to a stand-still, or a slight swing.



IGNITION APPARATUS FOR CARBON IN STEEL

Details of Ignition

In the operation of the train the furnace is run at a temperature of 940 to 1000° C. A half-factor weight of drillings is used. The drillings are placed in an alundum boat containing 90-mesh alundum sand. After thoroughly blanking the absorption bulb by continued aspiration with oxygen, the light weight is taken with the train aspirating the usual rate, which is usually about the same when the final weight is taken. After taking the light weight the drillings are introduced in the furnace, and the current of oxygen cut down to a few bubbles. As soon as the steel begins to burn, the supply of oxygen is gradually increased, giving the train all it will take without causing an excess bubbling in the absorption bulb. The burning of the steel usually requires from one to two minutes, depending on the carbon content. As soon as the burning is finished the supply of oxygen is cut down to a normal rate of aspirating. I use a faster rate of aspirating than that used on the regular combustion trains, without any loss. About 1½ to two minutes is required for the absorption of the CO_2 gas in the caustic solution. The determination of carbon in steel by this rapid method can be made in four to six minutes, depending on the carbon content. The drillings come from the furnace a fused mass of oxides.

Gas Bubbles Do Not Jar Balance

There is no noticeable vibration in the balance due to the bubbling of the gas in the absorption bulb, as might be expected. Using an absorption bulb as counterpoise eliminates to a certain extent any error due to change in temperature, or the presence of oxygen in the balance case. The oxygen valve is placed at the end of the box next to the balance, in order that the operator may control the supply of oxygen as he sits before the balance.

This method is more rapid than any method heretofore used, and is accurate. This rapid-combustion train is used for determination of carbon in the preliminary tests from the electric furnace. Three different men operate the train during the 24-hr. day, in conjunction with their other combustion work, and it is surprising how close the results check with those obtained on the regular train. The average error varies

during the course of a week from one to two points of carbon. With the rapid-combustion train as outlined above, and shown in the cut, an operator can get out at least 80 combustions in eight hours. There are no absorption bulbs to handle, the final weight is taken as soon as the CO_2 gas is absorbed, which means a saving of at least two minutes. I find that the balance as used in this work is sensitive to an amount equivalent to ½ point of carbon.

Recent Changes at Canadian Copper Co.*

The former acid converters, 10 in number, at the smeltery of the Canadian Copper Co. at Copper Cliff, Ont., have been replaced by five Peirce-Smith shells, 37 ft. 2 in. long by 10 ft. in diam,, outside measurement. They turn on four 12-ft. riding rings. The throat is placed at the center of the shell, instead of at the end, as in the Garfield plant. There are 44 tuyeres, 1¼ in. in diam., 7 in. apart. No tuyeres come directly under the throat. The length inside the lining is 33 ft. 3 in. long, the bottom is 2 ft. thick, the tuyere wall is 18 in. thick and the front wall 15 in. thick. The roof is 12 in. and the brick directly around the tuyeres 24 inches.

Oil Actuated Converter Tilter

Tilting is done by wire ropes passing around the converter shell (Eng. and Min. Journ., June 3, 1911). As the usual hydraulic equipment would not be suitable to the climate of Northern Ontario, oil is used instead of water, the oil being moved in the cylinders by air pressure. Two tanks are provided, one for regular use, one for emergency. These tanks are ¾-in. steel, 4 ft. in diam., 15 ft. high. A small amount of oil is pumped into these cylinders, and the space above filled with air at 75-lb. pressure. More oil is now forced in, compressing the air to 300 lb. When the converter is turned, the oil is used, allowing the air to expand, and the pressure to fall. At 200 lb., the oil pump automatically starts until the pressure again reaches 300 pounds.

The entire plant is electrically driven, and if the power goes off for any reason while the converter is blowing, it is obvious that the matte would normally flow back into the tuyeres. To avoid this, the spare tank referred to, is connected to the tilting cylinder by a valve held closed by a solenoid brake. The flywheel of the converter blower is large enough to turn the blower over for 15 or 20 sec. The solenoid brake goes off the instant the power does, and the converter is immediately turned up, before the flywheel stops.

Charging the Converter

The initial charge for a basic converter is about 60 tons of matte. About 10% of previously dried quartz is then dumped in, and the blast turned on. The charge is then blown 30 to 45 min., and slag skimmed. Five or six tons more of matte are added, with three tons of siliceous material, and the converter again blown. The length of blow, amount of slag to be taken off, the weight of matte added after each skim, and the flux added are all factors of the grade of the matte, and have to be determined by experience.

Repeated blowings, skimmings, and additions of matte are kept up until 70 or 80 tons of finished product remain in the converter. This may require 300 to 400 tons of furnace matte, and 30 to 50 hr. blowing time.

Apart from the advantage of larger units, there is no slopping over of the converter, less siliceous flux is needed, and the converter slags are cleaner, but as all the converter slag is re-smelted anyway, this last is not material.

Reverberatory Furnaces Fired with Coal Dust

Two interesting reverberatory furnaces have been built at Copper Cliff, expressly designed for firing with pulverized coal. They are 19x112 ft. in hearth area. The side walls are 27 in. thick. The roof is 20 in. thick for the first 35 ft. near the coal burners, and 15 in. the rest of the way. The extreme height inside is six feet. The bottom is an inverted magnesite arch of 12-in. spring. The spring of the roof is 19 inches.

In building these furnaces, a trestle 14 ft. high was built, and furnace slag poured from this until a block of slag was built up within the line of the outer walls, 10 ft. above the yard level. On this foundation were built the side walls of the furnace. Inside these side walls, slag was again poured to build up a hearth about 2 ft. thick. Between the two furnaces openings were formed by concrete retaining walls, so as to leave tunnels entering the slag foundation at the yard level, and at both sides of the furnace.

Furnace Bottom Construction

The hearth of the furnace was finally made by building an inverted arch of concrete of the same curve as the purposed magnesite arch on top of the slag foundation. On this, a layer of firebrick was laid flat, 2½ in. thick. Over this, 9-in. magnesite brick were laid in a mixture of ground magnesite and linseed oil. Expansion strips of wood were placed between every six courses, allowing ¼-in. expansion per foot.

The side walls are silica brick, 18 in. thick, lined with 9-in. magnesite brick, the latter not supporting any of the roof. The tap hole is so placed that 12 in. of matte always remain in the furnace.

Slag is taken out at the sides of the furnace, about 11 ft. from the front, just before the furnace commences to narrow. The furnace slopes gradually up to the space usually occupied by the skimming door, where there is a straight outlet for the products of combustion. This is a 6x9-ft. flue, 70 ft. long, leading to a dust chamber 15x19x177 ft., which in turn communicates with a 200-ft. stack, 15 ft. 4 in. in diam. at the top, 17 ft. 2 in. at the bottom.

At the fire end of the furnace there are two sets of charging bins, each having five hoppers, which discharge through sliding gates into the furnace.

Coal Dust Firing

The method of firing is as follows. Coal is dropped from the trestle into storage bins. From these it passes through a coal cracker on to a conveyor belt. The coal, ½ in. or under, is carried by this to a bin, whence it goes by screw conveyor, to a Ruggles Coles dryer. From here it goes to two Raymond impact pulverizers. These grind it so that most of it will pass 200 mesh. This pulverized coal is sucked by a fan up to a separator on the top of the building and sent by screw conveyors to the furnace bins. From these it is taken by five variable-speed screw conveyors, 4 in. in diam. These deliver the coal into five burners, dropping it in front of nozzles which carry air from a fan. The air blast sends the coal into the furnace in the form of a cloud or spray of dust which burns just like fuel oil. Each burner can be run separately, and the amounts of coal and air varied at will.

The slag from the converter building is brought to the reverberatory furnace in 10-ton pots drawn by locomotives, through the tunnels between the furnaces. Through openings in the tunnel roofs, the reverberatory cranes pick up the pots and pour the slag into the furnace. The matte is then tapped into the same pots, which have the slag skull for a lining, and taken to the basic converters.

Flue dust and green-ore fines are at present charged through the side doors by hand. The amounts were still low when the description was written, as the charge was wet and frozen, and the plant had been in operation only a short time.

In general, there is no difficulty in firing in this manner. Combustion is complete, and the ash Mr. Browne states offers no difficulties. A small amount of ash settles in the flue near the end of the furnace, and is removed through cleaning doors about twice a week.

*Abstract of a paper presented at the Toronto meeting of the Canadian Mining Institute, by D. H. Browne, entitled, "Recent Improvements and Additions to the Smelting Plant of the Canadian Copper Co."

Mining and Metallurgical Patents

A Classified List of New Inventions

A copy of the specification of any of these patents issued by the United States Patent Office will be mailed by "The Engineering and Mining Journal" upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

COPPER

ORE TREATMENT—Improvements in the Metallurgical Treatment of Oxidized Ores of Copper or Products Containing Copper. W. Dewar, London, Eng. (Brit. No. 10,143 of 1911.)

ROASTING—Process for Roasting Ores. Charles Gabrielle. (U. S. No. 1,018,609; Feb. 27, 1912.)

GOLD AND SILVER

AMALGAMATOR.—Charles C. Ellis, Chattanooga, Tenn. (U. S. No. 1,027,244; May 21, 1912.)

CYANIDING—Improvements in Apparatus for the Extraction of the Precious Metals from Pulp and Solutions. Turbo Amalgamator & Extraction Co., Ltd., London, Eng., and A. A. Lockwood, Surrey, Eng. (Brit. No. 22,627 of 1911.)

CYANIDING—Separating Device. John Edward Rothwell, Denver, Colo. (U. S. No. 1,028,789; June 4, 1912.)

STAMP MILL—Ore-Crushing Stamp Mill. Philip R. Stanhope, Denver, Colo. (U. S. No. 1,026,717; May 21, 1912.)

IRON AND STEEL

BLAST FURNACE CONSTRUCTION. James B. Ladd and David Baker, Philadelphia, Penn. (U. S. No. 1,027,738; May 28, 1912.)

BLOWING ENGINE—Apparatus for Supplying Air to Blast Furnaces, Converters, and the Like. Ralph H. Sweetser, Columbus, Ohio. (U. S. No. 1,027,781; May 28, 1912.)

CHARGING FURNACES—Apparatus for Charging Open-Hearth Furnaces, Etc. James Smith, Ealing, England, assignor to Babcock & Wilcox Co., Bayonne, N. J. (U. S. Nos. 1,028,619 and 1,028,620; June 4, 1912.)

GAS FILTRATION—Filtration of Furnace Gases. F. Muller, O. Johannsen, and P. Pape, assignors to Company Rudolph Böcking & Cie. (U. S. No. 1,022,496; Apr. 9, 1912.)

HARDENING—Method of Treating Steel. Auguste J. Rossi, Niagara Falls, N. Y., assignor to Titanium Alloy Manufacturing Co., New York, N. Y. (U. S. No. 1,028,389; June 4, 1912.)

ORE TREATMENT—Process of Treating Pulverulent Ores of Iron. Soc. Anon. des Ciments Portland Artificiels de Buda, Haren, Belgium. (Brit. No. 9901 to 1911.)

REFINING—Process of Refining Iron or Steel. Karl Albert Fredrik Hiorth, Christiana, Norway. (U. S. No. 1,028,070; May 28, 1912.)

SCRAP—Balling-Furnace. Morris Sellers and Hal M. Nicholls, Chicago, Ill. (U. S. No. 1,029,234; June 11, 1912.)

LEAD, ZINC AND OTHER METALS

ALUMINUM—Process of and Composition for Coating Aluminum or Its Alloys for Soldering, Etc. Braxton Davenport Avis, Jr., Clarksburg, W. Va. (U. S. No. 1,029,522; June 11, 1912.)

ANTIMONY AND ARSENIC—Method of Treating Antimony and Arsenic Ores. A. Trifonoff and D. Gardner, St. Petersburg, Russia. (Brit. No. 19,328 of 1911.)

MAGNESIUM—Melting and Casting Magnesium and Alloys Thereof. Berthold Hoffmann and Robert Suchy, Griesheim, Germany, assignors to Chemische Fabrik Griesheim-Elektron, Frankfort-on-the-Main, Germany. (U. S. No. 1,028,216; June 4, 1912.)

TIN—An Improved Process for the Recovery of Tin from Ores and other Tin-Bearing Materials by Conversion into Volatile Tin Compounds. A. Richards, London, Eng. (Brit. No. 26,644 of 1911.)

VANADIUM—Process of Extracting Metals. Auguste Henri Perret, Paris, France. (U. S. No. 1,028,774; June 4, 1912.)

ZINC—Agglomerating Process for the Recovery of Lead Contained in Fine Residues of Zinc Furnaces. Alexandre Folliet, Brussels, Belgium. (U. S. No. 1,029,182; June 11, 1912.)

ZINC—Improved Method in the Metallurgy of Zinc. Charles Victor Thierry, Paris, France. (Brit. No. 19,973 of 1911.)

ZINC—Improvements in and Relating to the Separation of Zinc from Zinc Sulphate Solution. K. Namekawa and J. Miyazawa, Tokyo, Japan. (Brit. No. 5967 of 1911.)

ZINC—Recuperative Zinc-Smelting Furnace. John Zellweger, St. Louis, Mo. (U. S. No. 1,028,417, June 4, 1912.)

ZINC-ORE ROASTING—Recuperative Roasting Kiln. John Zellweger, St. Louis, Mo. (U. S. No. 1,017,839; Feb. 20, 1912.)

NONMETALLIC MINERALS

ASBESTOS—Machine for Separating Asbestos from the Rock. Jesse E. Werner, Philadelphia, Penn. (U. S. No. 1,027,163; May 21, 1912.)

FULLER'S EARTH—Method of Separating and Purifying Fuller's Earth and Analogous Materials. Charles C. Ruprecht, Blakely, Ala. (U. S. No. 1,024,104; Apr. 23, 1912.)

SULPHUR—Improvements in and Apparatus for the Production of Sulphurous Acid from Sulphur. W. Field, Linz-on-Rhine, Germany. (Brit. No. 21,996 of 1911.)

MINING—GENERAL

BLASTING—Portable Detonator Magazine. Abram S. Hamilton, Nanaimo, B. C., Canada. (U. S. No. 1,026,860; May 21, 1912.)

BLASTING—Safety-Fuse. Harry A. Yates, New York, N. Y., assignor, by mesne assignments, to Y. & G. Electric Fuse & Engineering Co. (U. S. No. 1,028,173; June 4, 1912.)

DRILL—Pneumatic Drill or Like Machine. George Harry Hayes, Chicago, Ill., assignor to Chicago Pneumatic Tool Co. (U. S. No. 13,410; Apr. 30, 1912.)

DRILL—Rock Drill. Martin E. Thomas, Bowling Green, Ky., assignor of three-fourths to Willis W. Hester and Baley P. Belk, Bowling Green, Ky. (U. S. No. 1,026,886; May 21, 1912.)

DRILL BIT. John Sohacki and George W. Cook, Larksville, Penn. (U. S. No. 1,026,530; May 14, 1912.)

DRILLING—Fluid-Controlled Drill-Steel-Forming and Drill-Bit-Sharpening Machine. John George Leyner, Denver, Colo., assignor to The J. Geo. Leyner Engineering Works Co., Littleton, Colo. (U. S. No. 1,026,872; May 21, 1912.)

DRILLS—Automatic Turning Device for Fluid Hammer-Drills. John James Purcell, Burke, Ia. (U. S. No. 1,028,275; June 4, 1912.)

DRILLS—Dust-Collector for Drills. William Prellwitz, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,023,594, Apr. 16, 1912.)

HOISTING—Safety Device for Electric Hoists. Jay H. Hall, Cleveland, Ohio, assignor to Electric Controller & Manufacturing Co., Cleveland, Ohio. (U. S. No. 1,027,126; May 21, 1912.)

MINE-CAR COUPLING—Automatic Coupling for Mine Cars. Daniel H. Taylor, Tercio, Colo. (U. S. No. 1,028,634; June 4, 1912.)

MINE-CAR-DOOR LOCK. John Amos Rivers, Monongah, W. Va. (U. S. No. 1,026,964; May 21, 1912.)

MINE-CAR WHEEL—Robert F. Phillips and Louis J. McCloskey, Carrick borough, Penn., assignors to Phillips Mine & Mill Supply Co., Pittsburgh, Penn. (U. S. No. 1,026,454; May 14, 1912.)

ORE-LOADER. Nels P. Flodin, Marquette, Mich., assignor of one-half to Joseph P. Hodgson, Ishpeming, Mich. (U. S. No. 1,026,502; May 14, 1912.)

SUPPORT FOR MINING TOOLS or Machines. William Prellwitz, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,027,759; May 28, 1912.)

TUNNELING MACHINE. Adolph Fred Walther, Oakland, Cal. (U. S. No. 1,026,335; May 14, 1912.)

UNLOADING DEVICE for Mine Skips. Charles L. Lawton, Hancock, Mich. (U. S. No. 1,026,988, May 21, 1912.)

ORE DRESSING—GENERAL

CONCENTRATING TABLE. Gustave A. Overstrom, Chicago, Ill., assignor to Overstrom Concentrator Co., Butte, Mont. (U. S. No. 1,026,764; May 21, 1912.)

CRUSHING—Crusher Head for Grinding Mills. Harry A. Hunt, Wilmington, Del. (U. S. No. 1,026,319; May 14, 1912.)

CRUSHING MILL. Thomas Joseph Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co. (U. S. No. 1,027,222; May 21, 1912.)

LAUNDER—Ore-Concentrating Launder. Philip R. Stanhope, Denver, Colo. (U. S. No. 1,029,089; June 11, 1912.)

MAGNETIC SEPARATOR. Joseph Weatherby, Jr., New Cumberland, Penn., assignor to Andrew J. Dull, Harrisburg, Penn. (U. S. No. 1,024,538; Apr. 30, 1912.)

METALLURGY—GENERAL

CONVERTERS—Blast Connection for Converters. Richard Bernhard and Arthur Niedermeyer, Milwaukee, Wis., assignors to Power & Mining Machinery Co. (U. S. No. 1,026,556; May 14, 1912.)

CONVEYING APPARATUS for Use in Treating Ores. Henry John Stehli, Montclair, N. J., assignor to Dwight & Lloyd Metallurgical Co., Jersey City, N. J. (U. S. No. 1,027,084; May 21, 1912.)

CONVEYING APPARATUS—Mechanism for Treating Ore. Arthur S. Dwight, New York, N. Y., assignor, by mesne assignments, to Dwight & Lloyd Metallurgical Co., Jersey City, N. J. (U. S. No. 1,027,110; May 21, 1912.)

LADLE CAR. Erwin C. Sherman, Youngstown, Ohio, assignor to William B. Pollock Co., Youngstown, Ohio. (U. S. No. 1,026,708; May 21, 1912.)

METALLURGICAL FURNACE. George Hillard Benjamin, New York, N. Y. (U. S. No. 1,026,197; May 14, 1912.)

RECOVERY—Process and Apparatus for Recovering Metals from Their Ores. John A. Potter, Los Angeles, Cal. (U. S. No. 1,026,999; May 21, 1912.)

REDUCTION—Improvements in and Relating to the Reduction of Metal Ores. S. E. Sieurin, Hoganas, Sweden. (Brit. No. 14,027 of 1911.)

ROASTING—Improvements in or Relating to Ore-Roasting Furnaces. Emile Bracq, Lens, (Pas de Calais,) France. (Brit. No. 19,642 of 1911.)

PERSONALS

Mining and metallurgical engineers are invited to keep The Engineering and Mining Journal informed of their movements and appointments.

Herbert Haas is in Arizona on professional business.

J. Fred. Dierolf is developing mines at El Recreo, Anaime, Colombia.

J. Parke Channing has returned to New York from a long trip through the West.

Ludwig Vogelstein, of L. Vogelstein & Co., New York, sailed for Europe this week.

Norman Carmichael, general manager of the Arizona Copper Co., is visiting New York.

Robert Linton, general manager of the Sierra Consolidated Mines Co., is in Pittsburgh.

Quincy A. Shaw, president of the Calumet & Hecla Co., has returned to Boston from Europe.

Howland Bancroft has gone to Utah on professional business. He will return about July 1 to Denver.

Henry H. Armstead has left New York for Colorado Springs, where he will remain for a few weeks before returning to Guanajuato, Mexico.

Richard S. McCaffery, professor of mining and metallurgy in the State University of Idaho, left Moscow, June 19, on his way to New York.

Edward L. Dufourcq sails from New York July 2, on a business trip to England and France. He expects to return about the middle of August.

A. H. Storrs and G. P. Bartholomew have returned to New York from the examination of coal and timber lands in eastern Kentucky, after a three weeks' absence.

J. Read, superintendent, and Fritz Cirkel, consulting engineer, of the Champs d'Or Rigaud Vaudreuil, engaged in hydraulic mining in Beauce County, Quebec, have resigned.

Berthold Hochschild, president of the American Metal Co., New York, sailed for Europe, June 20, to be gone about three months, partly on business and partly on pleasure.

J. D. Hull, Seattle, Wash., has recently accepted the agency of the Edgar Allen American Manganese Steel Co. His territory is to be the western half of the state of Washington.

Dr. J. Bonsall Porter, head of the mines department of McGill University at Montreal, sailed for England, June 13. He will represent McGill at the Universities Congress in Edinborough.

James Jacoby, of Denver, Colo., is making an examination of some properties at Round Mountain, Nev. He will go from there to Oasis, Mono County, Calif., to look after some mines there.

Agnan Lefevre and Henri Engelbach, French engineers, who are members of the International Congress of Navigation, which met in Philadelphia last week, are in Duluth, examining the ore docks.

Prof. E. Dulieux, of L'Ecole Polytechnique, Montreal, recently returned from a visit to Gowganda and Porcupine, and left, June 15, to continue his investigations of the iron deposits of Quebec for the Provincial government.

A. J. McDonald has resigned his position as general superintendent of the talc mines and mills of the International Paper Co., at Gouverneur, N. Y. He had held that position since the organization of the company 19 years ago.

Ralston Bell has returned to Great Britain from the Ivory Coast, where he has spent a year in the management of gold mines for the French West African Co., and will have his address for the present at 11, Marchhall Crescent, Edinburgh, Scotland.

Earl E. Hunner, for years past in the engineering department of the Oliver Iron Mining Co., has been appointed chief mining engineer for the Arthur Iron Mining Co. The operations of the Great Northern iron ore properties will be handled in the name of this company.

C. E. Julihn has been chosen superintendent of the Utah Mining Co., on the Comstock Lode, in Nevada, succeeding the late James H. Kinkead, inventor of the Kinkead mill process of crushing, and proprietor of the mill of that name that has successfully treated Ophir and other Comstock ores.

OBITUARY

Henry Rhodes, a California pioneer of 1849, died at Campbell's Flat, in Tuolumne County, on June 13. He was 87 years old and had been engaged in mining in Tuolumne County in the earliest gold diggings.

Mason Whiting Mather, mining engineer, died at Oakland, Calif., June 14. He was 74 years old. Mr. Mather served with the naval engineering corps during the Civil War. He was a direct descendant of Col. Joe Mason and also Jonathan Edwards. He went to California from Colorado about 16 years ago. He was for several years manager of the Plumbago mine in Sierra County, California.

James H. Kinkead died suddenly at Reno, Nev., June 9. He was born in Ohio 69 years ago and when 19 years old went to California. In the early days of the Comstock lode he went to Nevada and was for a number of years connected with different mines on the lode. Later he removed to Reno and had since lived there, holding several official positions at different times. While on the Comstock he invented the Kinkead mill for treating the lower-grade ores and established a custom mill, which was at one time a successful enterprise.

Francis Steer Fox died in Salt Lake, Utah, June 16, aged 84 years. He was born in England, but was brought to this country when a child by his parents, settling first in Baltimore and later in Cincinnati. In 1852 he crossed the plains with a wagon train to California. He engaged in mining there in several places, finally settling in Plumas County, where he lived for a number of years. In 1881 he removed to Park City, Utah, where he held a position with the Ontario Mining Co. until 1898, when he retired from business and settled in Salt Lake City.

Frank E. Jordan, a pioneer mining man of California and recently a resident of Berkeley, died at Los Gatos, June 16. Mr. Jordan went to California in the early seventies and later went into Yavapai County, Arizona, where he was identified with the development of that section. He was one of the original locators and owners of the power rights of the Arizona Power Co.; was associated with Senator W. A. Clark in securing some of the holdings of the United Verde Copper Co. He retired from active mining and returned to California in 1904, residing at Pasadena and Berkeley. He was 64 years old.

James Sheridan, one of the best known of the early prospectors in the Minnesota iron country, died at Duluth, Minn., June 15, aged 72 years. He was born and brought up in Illinois and served through the war in an Illinois regiment. After the war he went to Michigan where he was for a number of years employed in different mines on the Marquette range. About 1880 he went to Minnesota and was concerned in the discovery and opening of the famous Chandler mine at Ely on the Vermillion range. From there he went to the Mesabi range, where he located and opened the Sheridan and two or three other mines. He retired some years ago and has since passed a good deal of his time in Mexico.

Societies and Technical Schools

University of Minnesota—Professor Newton H. Winchell, of Minneapolis, for many years state geologist of the Minnesota Geological and Natural History Survey, has presented his geological library to the University of Minnesota. This library is probably one of the best private collections of geological literature in this country and was built up through the years when Professor Winchell, as editor of the *American Geologist,* had unusual opportunities for obtaining the earlier serial and regional reports of this and foreign countries. Many of its volumes are priceless. The library is now being installed in the Department of Geology at the University of Minnesota and will be known as the "Winchell Library of Geology," to which hereafter donations and exchanges should be addressed.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

June 19—The undertaking by the South Eureka Mining Co. to dispose of the tailings from the mill is also being joined in by other mines on the Mother Lode in Amador County. This work is to be done to adjust the complaints made by the farmers on Jackson and Dry Creeks. The mine owners along the lode from Jackson to the town of Dry Creek have spent $15,000 in clearing away the débris from the streams into which the tailings have been run. This débris has been largely from sources other than the quartz mills. In some instances the creeks were dammed and obstructed by fallen trees and the shore wash. In almost every instance where the tailings have been detrimental to the land the cause has been that the streams were obstructed and the tailings not allowed to pass. The plan of the South Eureka company is to build ditches to carry the tailings into a ravine that provides a natural impounding basin for a length of about nine miles. This ravine heads in south of the Eureka mine and extends to within about three miles of the town of Ione. The Central Eureka mine, which joins the South Eureka on the north, will carry the tailings from the stamp mill into a ravine which has its head between these two mines. The Kennedy Mining Co. has recently purchased a large acreage of land adjoining the Kennedy on the south, and it is said that this field will be the depositary of the tailings from the Kennedy mill.

There has never been a time that the mining operators on the Mother Lode in Amador County were unwilling to do all possible to prevent any detriment to the soil of the farm lands by the tailings. A good deal of the complaint has been really without basis. Investigations have shown that a great deal of the damage has been done by the sands washed down from the hills by freshets. The excessive floods of 1910-11 brought down accumulations of sand and débris that collected along the streams. Much of this came from the old placer claims that had been worked for years. The mill tailings did cause some overflow. But the majority of the creeks had been operated by subirrigation and dams were put in which caused the formation of big ponds in the streams. These dams were allowed to remain and the farmers did not realize that these were the cause of overflow and damage to the soil. The committee of mines looked over the streams and considered the complaints of the farmers and agreed that if the farmers would clean out the creeks and keep them cleaned along the unobstructed flow of water, the mine owners would pay for any damage done by the tailings. The mine owners paid for the cleaning out of the creeks and they expect that the farmers will at least assist in keeping them clean and thus prevent the damage that might otherwise result.

Denver

June 20—The laudable efforts of the Denver Chamber of Commerce, which launched the Colorado Grubstake & Mining Co. a year ago, in the interests of the mining industry, have not met with success. About $9000 were originally raised, most of which was used in equipping prospectors in the hope that they would find valuable claims, or discover a new mining camp somewhere in the state. About 30 or 40 claims were staked and recorded but when capital was appealed to this year for money to develop the properties discovered, which were to be owned half by the discoverers and half by the company, it failed to respond, and the affairs of the company have been closed out and the corporation dissolved.

Butte

June 19—For the purpose of making arrangements for the construction of a zinc concentrator, which will be situated on the side of Timber Butte, about two miles south of Butte, Senator Clark, accompanied by W. A. Clark, Jr. and Arthur McGuire, assistant chief engineer of the San Pedro, Los Angeles & Salt Lake R.R., is in Butte, to remain the rest of the month. Senator Clark will install uptodate methods and machinery for concentrating zinc ore. A new gallows-frame has been ordered for the Elm Orlu mine, and an additional spur track will be installed. The shaft is being sunk again and is now 1500 ft. deep. It has not yet been decided whether the railroad extension from the mill to the main line will be operated by steam or electricity, but Mr. McGuire accompanied Mr. Clark here to consult with him as to the best route for the line, and method of operation. When the plans are completed the work will be started and rapidly pushed to completion.

With the object of assisting the state board of examiners in establishing a sanitarium for the treatment of miners' consumption and tuberculosis, the Anaconda company has made a donation of $25,000, which will enable the board to begin the erection of buildings immediately on the chosen site near Warm Springs. The plan has been under agitation for years by the Miners' Union and citizens of Butte, and several bills placed before the legislative assemblies from time to time, have been defeated, up to the last session, when Representative McNally of Silver Bow County succeeded in passing the bill. The state appropriated $20,000 for the purchase of the site, and the erection of the buildings, with a maintenance appropriation of $5000 per year. The board decided that this amount was insufficient, and had it not been for the donation of the Anaconda company, the work would have been delayed until at least another meeting of the legislature. The company offered either the $25,000 cash, with the option of buying any site selected by the committee, or $5000 per year for maintenance, together with the donation of a site. The former offer was accepted and the erection of the buildings will be started soon.

Salt Lake City

June 20—In connection with the recent decision of the Department of the Interior and the Land Office, placing a new construction on the mining statutes requiring a mine or lode of mineral-bearing rock in place, possessing in and of itself a present or prospective value for mining purposes, making it difficult or impossible to secure patent to valuable mineral property in demonstrated mineral districts, it is interesting to note that in two of the most productive camps of the state, Park City and Tintic, actual outcrops of commercial ore were almost unknown. In Park City there was a small outcrop on the old Ontario vein and an outcrop (?), or galena float, in Woodside Gulch, on what is now the Silver King Coalition property. Under the present ruling the development of this camp, which has produced ore worth $100,000,000 and paid dividends of $40,000,000, would have been greatly retarded. In Tintic the greater part of the camp absolutely lacked outcropping mineral.

Resolutions protesting against the new regulations were adopted by the Salt Lake Stock and Mining Exchange, and forwarded to Utah's representatives in Congress. These call attention to the

fact that it is often desired to locate only a small fraction of ground in places, where the depth of the deposits is such that the cost of making actual discovery on every claim is prohibitive. Also that the mining industry is being retarded and that it would be to the advantage of the Western states if legislation along the following lines were enacted to correct the recent ruling: That congress should enact legislation covering cases where mining claims are located in a recognized mineral district, and the land embraced therein has no value for timber, power sites, water, or agricultural purposes, but is valuable only for its mineral resources; it should be sufficient, in the case of lode claims, to discover mineral-bearing rock in place, or to demonstrate geologically that the mineral-bearing formation or horizon (known to be mineral-bearing in other properties in the district) is within the ground, without actual discovery of the presence of mineral; that any discoveries, or indications of mineral upon which a reasonably prudent man would be justified in spending his time and money in developing such claims in the hope of ultimate success should be sufficient to satisfy the land department.

Negaunee, Mich.

June 22—The Volunteer mine at Palmer and the Rogers mine at Iron River have closed down; the Maas mine at Negaunee, which has been idle for a year, will start operating with a large crew about July 1, and the Negaunee mine adjoining has begun working two shifts in place of the one shift which has been worked for some time. The Volunteer had been employing 180 men and had been hoisting 200 tons of high-grade bessemer ore per day, which was being shipped from the pocket, although no stockpile shipments had been made from the good-sized stockpile on hand. The mine is operated by the Volunteer Ore Co., composed of G. A. Tomlinson, C. A. Congdon, T. F. Cole, and associates of Duluth, while Thomas Pellow, of Negaunee, is general superintendent. The closing of the mine is due to the low price of ore, as it was believed that not enough profit was being made from the sales; the orebody, while high grade, is costly to mine and is narrow. It is believed that the mine will be reopened when more satisfactory sales are arranged for; in the meantime the pumps will be kept going.

The Rogers mine of the Rogers-Brown interests, three miles east of Iron River, was sinking a shaft and developing for production next season. The cessation of operations will be only temporary as there is a large orebody of favorably situated ore at this mine, and elaborate preparations had been made for mining it along uptodate lines, including the sinking of a concrete shaft through quicksand. It is believed that the shutdown is only for the purpose of curtailing expenses temporarily. Captain Walter Gulgren, who was in charge of the sinking, has gone to the Cuyuna Range for another company; H. L. Chamberlin, the superintendent, has been transferred to the Chicagon mine.

The action of the Cleveland-Cliffs Iron Co. in increasing forces at the Negaunee mine and reopening the Maas, both large mines, is treated as a sign of better times on the Marquette Range, as the sentiment prevailing is that when the Cleveland-Cliffs acts, it is for sound reasons. Three or four hundred additional men will be given employment. The Maas mine has been idle since last summer.

Silverton, Colo.

June 20—Prospecting is being extensively carried on this year and many old prospectors have returned to the district to search for mines in neglected territory. The discovery of ores, both while exploiting virgin territory and while exploiting the workings of supposedly worked out mines, is having a good influence in the revival of activity around Silverton.

It is believed here that a sale of the Buffalo Boy mine will be consummated soon. This event would largely increase activity on the eastern range, as it is claimed that the Buffalo Boy ore is a good cyaniding possibility and it is hoped that its sale will mean the erection of a large plant of this character. The sale of the Emma mine, in Ice Lake Basin, to Boston men last year, has raised much enthusiasm regarding the porphyry-filled fissures of this section carrying high-grade argentiferous galena. The last cars of ore shipped from the Emma mine carried in excess of 70% lead.

Increased activity will evidently take place in the Ice Lake region and on the entire eastern range. The success of electrostatic separation for the zinc ores has already stimulated the production of ores carrying lead, zinc, copper, iron, gold and silver and there is probably far more ore of this character exposed in San Juan County than in any other.

Fairbanks, Alaska

May 29—The quartz miners are considerably discouraged over the outlook, mainly on account of high transportation costs and the wage scale. Freight from Seattle is $60 per ton, and Fairbanks to the mines varies from $5 to $20 per ton Wages for all classes of labor, muckers receiving as much as skilled miners, are $5 per day and board. It costs $2.25 per day to feed a man. Hay and oats are $90 per ton in Fairbanks. A team of two horses and a driver receives $25 per day. Wood is $12 per cord delivered at the mines on Cleary Creek.

The camp must be considered a base-ore camp from the grass roots down. From the surface to water level a large portion of the gold is free milling, but the veins carry silver iodides and bromides which are lost. Antimony and bismuth occur, the former being quite prevalent. Heavy iron sulphides are appearing at water level and stringers of galena carrying silver. Zinc has also come in with the galena on Cleary Creek. The majority of the veins are narrow, from stringers up to 18 in., although there are larger lodes of lower grade. It is a shipping camp, with Tacoma as the destination, but the transportation companies controlling the steamers do not seem to offer any encouragement. Their steamers and barges go down the Yukon without a pound of freight and the ocean steamers from St. Michaels to Tacoma also. They charge $40 per ton under 500 tons and $20 per ton for 500 tons and over. With railroad and teaming, for shipments over 500 tons, this will amount to about $30 for transportation. It is hoped that the Interstate Commerce Commission will give the camp relief. There is no coal available for smelting until a railroad opens the Matanuska field and connects with the Yukon River.

Toronto

June 22—At a meeting of the directors of the Canada Cement Co. Ltd., at Montreal, on June 21, the questions of the supply of cement on hand and the difficulties of transportation were taken up. Official figures show that on June 12 the company had on hand 1,085,503 bbl. of cement, while unfilled orders west of the lakes amounted to 149,214 bbl., of which 60,707 bbl. were in transit. On the same date the company was short 300 cars, and their deliveries at the head of lake navigation by boats was 182,254 bbl. less than they had planned, owing to late opening of navigation, shortage of steamers, etc. Having in view the growth of the West the directors authorized the building of four steamers for the company's use. The capacity of the company's present mills is 10,000,000 bbl. per year, which is being increased as rapidly as is justified by the market.

The organization of the Asbestos Corporation of Canada, which has taken over the assets of the Amalgamated Asbestos Corporation, was completed on June 20 by the election of the following board of directors: President, W. G. Ross; vice-president, Howard E. Mitchell; W. McMaster, H. J. Fuller, Thomas McDougall, W. U. McCarter and C. W. Colby. Mr. Colby goes on the board as the representative of British interests. The capital consists of $3,000,000 first mortgage, 4-year 5% bonds, and $4,000,000, 6% preferred stock, participating with the common after the latter has received 5% dividends on $3,000,000 common stock.

The Mining News

The Current History of Mining

Alabama

Alabama Consolidated Coal & Iron Co.—In Trenton, N. J., June 21, the Court of Chancery appointed receivers for this company in proceedings brought by the American & British Manufacturing Co. This follows an unsuccessful attempt to reorganize the coal and iron company. The receivers are Halsey M. Barrett, of Newark, N. J., Parry Coffin and Harrison S. Matthews, of Birmingham, Ala. In addition to a heavy bonded indebtedness, on which default has been made, the company had a current liability, Apr. 31 last, of $726,485. A pay roll aggregating $40,000 was not met last week.

Alaska

The first spring shipment from Yukon Territory and the interior amounted to $255,000, and arrived in Seattle June 17.

Fairbanks District

Newsboy—The mine commenced operating the 5-stamp mill, May 12. It is not known definitely what results have been obtained, although the ore averages $40.

Mizpah—Messrs. Thompson and Guis will erect a two-stamp Nissen mill this summer. The vein is 18 in. wide and will average about $50. The shaft is down 100 ft. and 100 ft. of drifts have been run on the first level.

Arizona

Gila County

Superior & Boston—The mine continues to ship ore from the stope below the sixth level on the Great Eastern vein and is preparing to reopen the Limestone shaft and mine the ore on the second and third levels of the Limestone vein.

Arizona Commercial—Enlargement of the Copper Hill shaft continues. After the foreclosure sale in July, it is purposed to erect at this shaft the double-drum hoist now at the Eureka shaft and connect it with an electric motor, current to be transmitted from the Old Dominion. Compressed air will also be furnished by this plant and development work started below the fourth level.

Old Dominion—The company is cancelling many of the leases on its various properties, on account of the passage by the state legislature of the miner's lien law, which provides that liens shall attach to mining claims for debts contraced by lessees.

Miami—Construction work has been started on the new machine shop and change house at No. 4 shaft. These buildings will take the place of the ones at No. 2 shaft, which are situated directly over the orebody and will have to be abandoned, as mining progresses. No. 4 is the permanent working shaft, situated at some distance from the orebody.

Southwestern Miami—Churn-drill holes Nos. 5, 6, 7 and 8 are 705, 460, 360 and 160 ft. deep, respectively. No. 6 hole has been drilled to a depth of 545 ft., but is being enlarged by under-reaming, which has progressed to a depth of 460 feet.

Barney—Churn-drill hole No. 3, corresponding to hole No. 5 on the Southwestern Miami, is 705 ft. deep.

South Live Oak—Drilling has been resumed in hole No. 1 and is proceeding satisfactorily. The hole is 675 ft. deep in granite, carrying carbonates of copper and some chalcocite. The hole is evidently in the oxidized zone and it is hoped that after this is passed through ore will be encountered.

Black Warrior—Underground work has been discontinued. E. M. White, manager, says that this is temporary and that work will be resumed in three or four weeks, after the construction work is completed. A new stable and warehouse are being erected, necessitated by the recent sale of the campsite to the Inspiration company for the erection of its proposed 7500-ton concentrator. Ore that has been accumulating in the bins is being shipped.

Duquesne—Three men are mining the gold-lead ore on contract and about 100 tons are ready for shipment. The ore occurs as free gold and lead carbonate, with limonite-stained quartz at and near the intersection of fissures in limestone, closely associated with porphyry dikes; it averages from $15 to $25 per ton in gold and lead.

New State—Two new dwellings have been erected and the sinking of the shaft on the Republican claim will be resumed soon. The shaft is 50 ft. deep and has disclosed a variable width of high-grade lead-carbonate ore, carrying wulfenite, the latter decreasing in amount with depth and the amount of lead carbonate increasing. Four men are employed.

Pinal County

Ray Consolidated—This company shipped 125,000 tons of crushed ore to the Hayden concentrator during May, and is working 1600 men per day underground. The payroll for May was $142,000. The placing of pumps to drain mine No. 2 has been finished, and the installation of a signal system for the mine is under way; the electric haulage line to the Ray Central is completed, and trolley wires are being strung; the hill, which prevents the laying of a spur to the Ray Central, is to be cut away, and a force of 50 men is employed there. Experimetal launders are in process of erection at the southern section of No. 2 mine, and, if successful, others will be installed wherever it is found that precipitation will justify.

Calumet-Pinal Mines Co.—The properties were sold at auction recently, at Florence, to Nott E. Gild, who will transfer the titles to the Tortolitas Copper Company.

Mammoth-Collins—This property has been optioned by A. B. Bement and associates.

Caledonia—Copper ore, with gold and silver contents, has been found on the 100-ft. level of the initial shaft.

California

Amador County

Argonaut—John Ferri, a miner, was killed by falling 70 ft. in the inclined shaft. There was no blame attached to the company.

Oneida—M. Mucibobich, a miner, was killed by caving ground at the 1800-ft. level. He was a machine man, but at the time of the accident was assisting another man shoveling, to clear a space for the machine.

Calaveras County

A suit has been filed in the Superior Court of San Andreas by L. J. Hutchinson and M. Arendt against the Sierra Ry. Co. for $5000 damages alleged to have been done to the chlorination works at the Jones mine on Carson Creek. The damage was caused by the explosion of dynamite in a freight car. The chlorination works have been idle for several years.

Inyo County

Four Metals Co.—The $120,000 bonds of this company were sold to W. W. Watterson, of Bishop, on June 10. These bonds were deposited in the Inyo County Bank in 1910 to secure creditors. Through the sale of the bonds the creditors will receive a percentage of the money now due them. By this arrangement L. D. Gordon and associates will secure control of the Cerro Gordo mine.

The mine will continue operation and is shipping zinc ore at the rate of 1000 tons per month. New machinery including compressors and concentrators will be installed.

Skidoo—Since May 1 the cyanide precipitates shipped by express to the Selby smeltery had a total value of $10,800.

KERN COUNTY

Powel—The milling of 12 tons of ore from this mine, northwest of White's camp, at the Red Dog mill, netted 1500 lb. of tungsten concentrates and some gold.

Butte—Forty-four tons of ore from the Shipsey lease returned $4400 in gold at the Red Dog mill; 40 tons are also being milled from the King Solomon lease.

Lamberson & Co.—Twenty-one tons of ore from the King Solomon lease are ready for milling.

King Solomon—It is reported that the property will be sold by J. J. Miller to Edward Shipsey, G. W. Beck and associates.

Custer—A 3-ft. vein of lead-silver ore has been disclosed in the 204-ft. level of this mine, 24 miles southeast of Keeler. The orebody has been cut at the 180-ft. level. Ore is sacked for wagon haul to Keeler. The recent equipment includes a 16-hp. gasoline hoist, orebins, ore screens and an automatic dumping device. The mine has been idle since 1883. John Thorndyke is leaser.

MODOC COUNTY

A plat has been filed of the new town of Branley, situated in the center of the Highgrade district and surrounded by the Big Four, Alturas, Josephine, Consolidated, Huckleberry and Seven Lakes mines. The townsite comprises 60 acres divided into 20 blocks. The geographical position is midway between Fort Bidwell and New Pine Creek. A road has been opened through the snow from Branley to the two other camps. It is probable that two new postoffices will be established, one at Modoc and one at Triangle.

MONO COUNTY

Noonday—The old Cornish pumps have been taken out and an electric pump will be installed to unwater the shaft. The bringing in of electric power has made mining and milling profitable in the Bodie district.

SHASTA COUNTY

Gladstone—The 900-ft. shaft is being deepened to 1500 ft. There is also a 3000-ft. adit. Thirty stamps are dropping. The product of this mine for 1911 is reported at $362,000. E. L. Young, French Gulch, is superintendent.

SIERRA COUNTY

Shipsey & Smith are in good ore on their quartz property in Jim Crow Cañon, and contemplate the erection of a stamp mill.

Sierra County's efforts to secure a branch of the state highway from Marysville to Downieville along the Yuba River at water grade, have been indorsed by resolutions passed by the Yuba County supervisors at Marysville. This would give a road with little grade and practically snowless at all seasons, which would greatly aid in the development of the large mining and timber interests in Sierra County.

TRINITY COUNTY

Enterprise—The last cleanup amounted to $3500. Four small machine drills are in use in the stopes.

Alaska—New track and cars have been installed in the lower tunnel.

Oversight—No. 2 tunnel is being pushed ahead rapidly. When it reaches the vein, it will give about 160 ft. of stoping ground and will effect a saving in ore extraction.

TUOLUMNE COUNTY

App—The Tonopah-Belmont Development Co., that recently had this mine sampled, has definitely decided not to purchase it.

Colorado

CLEAR CREEK COUNTY

Dives-Pelican & Seven-Thirty Mining Co.—This company's claims, on Sherman Mountain, at Silver Plums, and the 250-ton Pelican mill, have been sold at sheriff's sale for $32,750, and were bidden in by George E. Tarkington, for three years manager of the property.

Alco Mining & Milling Co.—Mining is to be resumed by James J. Cully, general manager. A new hoist and compressor are to be installed and the shaft will be sunk another 100 feet.

Poso-Gilpin—The company has been shipping heavily from the lateral on the Dyke lode, in the Newhouse tunnel, and has let a contract to Morrow & Wright for the erection of orehouses and bins at the mouth of the tunnel.

LAKE COUNTY—LEADVILLE

Winthrop Gold Mining Co.—The machinery is in the Leadville yards, awaiting an answer to the request that the South Park R.R. put in a spur to its property, in Big English Gulch. The company has agreed to do the grading if the railroad will lay the rails.

Across-the-Ocean—Manager Gilroy has a pumping plant installed and is shipping regularly from the shaft on North Breece Hill. He expects to sink the shaft deeper and to connect with the lower levels of the Great Hope.

Chrysolite—The Leadville Light & Power Co. is installing a 22-hp. hoist at the Chrysolite shaft.

LAS ANIMAS COUNTY

Victor-American Fuel Co.—An explosion in the Hastings mine, on June 19, is reported to have killed 13 men and injured others.

OURAY COUNTY

Camp Bird—The directors have decided to alter the date on which the financial year ends, from Apr. 30 to June 30, to conform with that of the Santa Gertrudis Co., Ltd. The Camp Bird earnings are estimated at £230,000, which, together with a dividend of £157,000 from the Santa Gertrudis, make total receipts of £387,000 from Apr. 30, 1911, to June 30, 1912. Approximately £66,000 will be carried forward. Developments at the Santa Gertrudis are satisfactory.

Mono-Baltic Mining Co.—It is claimed that these mines, in the Red Mountain district, near Ironton, are capable of producing 150 tons per day of $20 ore, and that E. W. Averil, of Boston, president, will arrive soon in Ouray, to build a 200-ton smeltery. P. Carbally is superintendent.

Poughkeepsie—This mine, in Poughkeepsie Gulch, was celebrated in the early days for the richness of its ore shipments, and its dumps are said to contain several thousand tons of low-grade ore that will now pay to treat. H. L. Damschroder, Ouray, states that the mine may be reopened and a mill built this summer.

SAN JUAN COUNTY

Some tungsten ore has been brought in from Taylor & Elston's new find on the Million lode which shows a pay streak 1 ft. wide of huebnerite in quartz. They report having six tons of this ore on the dump which will run 15% tungstic acid. This is the second strike of good tungsten ore that they have made this year. They claim that both finds appear to be important.

Gold King—The railroad to Gladstone is in operation and the mill will be put in shape to run at full capacity. The mine is operating under the leasing system and the use of the mill will be apportioned among the different leasers, although the same mill crew will carry on all operations. The ore is pyrite, carrying gold.

Silver Lake—This company, which resumed operations last year, has been producing steadily and will soon commence the production of ore from the Aspen mine, running the 300-ton concentrator at its full capacity.

Ross Mining & Milling Co.—This company has resumed operations under a complete new management. Operations have started on the Champion and Galty Boy mines. This company owns the only smeltery at Silverton.

Green Mountain—Work has again been resumed. An effort will be made to

make a good zinc product in the mill. Last year a car of crude ore was shipped which is reported to have run in excess of 50% zinc.

SUMMIT COUNTY

Gold dredging at Breckenridge is flourishing; there is an abundance of water and several of the old "high-bar" placers are again being operated. The three dredges, operated by the Colorado Gold Dredging Co., the French Gulch Co., and the Reliance Co., are steadily at work, in Swan and French Gulches.

TELLER COUNTY—CRIPPLE CREEK

Happy Year—Mining has been resumed at the Bull and Raven Hill properties, by D. O. Darnell, lessee. Mining was suspended because heavy snow drifts blocked the road and prevented the hauling of supplies.

Little Wonder Mining Co.—This company has been incorporated to do general mining business in Cripple Creek, with a capitalization of 50,000 shares of $1 each. The directors are: Franklin Brooks, H. G. Lunt, C. S. Thomas and others.

Portland—This company has completed the installation of the cyanide process in the Colorado Springs mill, to take the place of its old chlorination plant. The capacity is 450 tons.

United States Reduction & Refining Co.—The tailings dump of the Standard mill, at Colorado City, will be worked over by P. A. Hardwick and Frank Dunnington, who will construct a 40-ton experimental amalgamation plant, using the Hardwick process for concentrating.

Idaho

BLAINE COUNTY

Red Elephant—P. A. Danaher, who is working the tailings dump, started his new concentrator June 1. He estimates it will take three years to rework the dumps.

Pulaski Mineral Co.—This company, which has been working the Elkhorn and Noonday group of claims for three years, suspended operations June 1. H. J. Hardess is manager.

Queen-of-the-Hills Extension—This mine has been bonded to E. J. Gordon, of Hiawatha, Kan., who is developing it through the Queen-of-the-Hills tunnel.

BONNER COUNTY

International Smelting & Refining Co.—This company has made a contract to handle the ores from the Idaho Continental mines, north of Priest Lake, and 23 miles from Porthill. It is reported also that $150,000 have been advanced by the smelting company to equip the mines and that an auto-truck road will be constructed for summer use. New machinery will be installed.

COEUR D'ALENE DISTRICT

Snowstorm—The new mill has been placed in operation and is doing excellent work. In fact, it has proved such a success that the machinery for a new unit is being contracted for, and work will be begun on it soon. The copper mineral is finely disseminated in hard quartzite gangue and has always been difficult to handle. The Hardinge mill, which has been installed for fine grinding, has done away with this trouble to a great extent, freeing the minerals without an excess of slimes.

Rex—This property is to be operated again in July. The lease has been extended and the arrangements are nearly completed to finance and operate the mine. Work was suspended some time ago, owing to financial difficulties. R. E. Sloss, manager, will be in charge again.

Michigan

COPPER

Adventure—The crosscut from the new No. 5 vertical shaft has encountered what is believed to be the No. 3 lode of the series revealed about three years ago in the drilling explorations and which gave the richest cores. This lode has been reached about 850 ft. from the shaft. Drifting continues on the No. 2 lode with good results.

Old Colony—No. 14 drill hole has encountered a copper-bearing formation of encouraging appearance.

Quincy—No. 9 shaft is down over 2000 ft. and an improvement has been noted in the mineralization for the last several hundred feet. Sinking will continue until the shaft has reached the drifts from No. 8 shaft, which have been extended beyond this shaft, and when this has been done lateral openings will be started at various points.

Houghton—Recent developments at this property have been satisfactory; a winze sunk on the main lode has come into some heavy copper and the West lode is opening good ground.

Hancock—No. 2 vertical shaft is bottomed in a trap formation at 3675 ft. The lode recently cut by the shaft has not been definitely identified, but has the characteristics of the Pewabic lode and the management is reluctant about making any statements regarding its identity.

Osceola—A statement for the first half of 1912, with June results estimated, shows: Rock stamped, 623,750 tons; cost, $1.19 per ton; copper per ton, 13.5 lb.; total cost per lb., 10.67c.; and $496,506 estimated earnings.

Superior—Developments on the West lode, which is being opened from the 12th to the 18th levels, continue satisfactory. The shaft is sinking below the 19th level, but this station will not be cut until the shaft has reached the 20th level, when crosscutting to the lode will be started from both points at the same time. This company is sending about 800 tons of rock per day to the mill.

IRON

Rolling Mill—Stockpile shipping by steam-shovel began recently over the Lake Superior & Ishpeming Ry.; a large stockpile of high-grade ore is on hand. A Sullivan hoist has been ordered for No. 2 shaft, and will be installed in the old engine house. The new 90-ft. headframe, being erected by contractor J. S. Wahlman, is of the same design as the one over shaft No. 1, except that the timbers are 12x12 instead of 14x14 in.; there will be no backbrace, but the cable will be run along the ground and under a sheave at the foot of the headframe, then up over the top sheave and down, making the resultant of the pull on the headframe a vertical one. The foundation is of eight concrete piers; the headframe will be covered with corrugated iron similar to No. 1.

Minnesota

It is rumored that a washing plant will be erected at Swan Lake, to treat low-grade iron ore from the Great Northern lands.

Montana

BUTTE DISTRICT

Pilot—As a result of work done on the 900- and 1300-ft. levels, it is believed by the engineers that the Berlin vein of the North Butte company passes through the property. It has been decided to sink the shaft to the 2000-ft. level before any further development work of importance is done, in order to determine if better ore will be found than on the levels above. Considerable zinc ore has been discovered on the 1300-ft. level in a vein of northwest strike, opened by the main crosscuts. On the 900-ft. level, a vein carrying manganese silicate and blende was encountered 40 ft. from the shaft and drifted upon for 260 ft. It is reported that the east drift is coming into good zinc ore.

BROADWATER COUNTY

Keating—When the branch of the Chicago, Milwaukee & Puget Sound R.R. is completed, the company, which is shipping at present about 100 tons of ore per day, will probably increase this amount. Twelve miles of grading have already been completed on the most difficult part of the road, and track laying will commence soon. The shaft has reached the 800-ft. mark, and after a 50-ft. sump has been sunk from this point, crosscutting will be commenced on the 800-ft. level. On the 700-ft. level, about 50 ft. of drifting have been done on the vein from the intersection by the crosscut, showing about 4 ft. of ore.

FERGUS COUNTY

New Year—This mine and mill, acquired some time ago by the Rhinegold company, composed principally of Chicago men, are again running. The new company is doing considerable development work, and the mill has been entirely remodeled to a capacity of 400 tons of ore per day. Bullion is being turned out regularly.

GRANITE COUNTY

Henry Jupenlatz, who owns a placer mine in Princeton Gulch, is preparing to install hydraulic washing machinery and to operate on a larger scale than formerly.

Wasa—Representatives of the United States Smelting, Refining & Mining Co., have taken an option on this group of claims, in the Dunkleberg district, from Edward Challender and A. Hallender, of Granite, and work will be commenced July 1. The six claims are traversed by a wide contact vein between walls of slate and porphyry, carrying zinc and copper, with some gold and silver. On account of the high percentage of zinc in the ore, it is not profitable to ship with the present poor facilities, but the conditions are said to be favorable for a concentrator.

JEFFERSON COUNTY

Flemming—Work is progressing at these mines, recently acquired by the Dow interests. A separate organization will probably be effected to operate the property. Shaft sinking has started and machinery will be installed.

LEWIS AND CLARK COUNTY

St. Louis Mining & Milling Co.—The management has changed and George H. Quinby is manager, succeeding W. Mayger. The mill has been operating 20 of the 60 stamps. Development will be pushed actively and the intention is to erect a 100-ton cyanide plant to treat the tailings. The property is in the Marysville district.

PARK COUNTY

United States Gypsum Co.—The company has taken an option on a bed of gypsum, at Electric, near Livingston. Development will be started with a view of erecting a plant for the working of the deposit in case it warrants.

POWELL COUNTY

Twin City Mining & Milling Co.—Steam sinking equipment has been installed on the Ella Churchill claim on the property, nine miles southeast of Elliston. The main 4x8-ft. working shaft is 100 ft. deep. A crosscut will be started at 200 ft. The ore is a sulphide, carrying gold, silver, lead and copper. The crosscut at 80 ft. opened 3½ ft. of shipping ore. The vein is 20 ft. wide between walls. The company is controlled by St. Paul men; William M. O'Connell is president and Allan McNaughton is manager.

Nevada

COMSTOCK LODE

Consolidated Virginia—A connection has been made with the 2300-ft. level by the three-compartment raise from the 2400-ft. level. Further work is contemplated in the ore on the 2400 and at an intermediate level. Returns received from the smeltery on 520 tons of ore milled at the Kinkead mill gave a net cash yield of $14,066. The concentrate shipment netted $11,728 and the bullion $2337.

C. & C.—It has been announced that the new temporary pumping plant at the 2300 station will probably be ready for a test run by July 1, and when in steady operation work will be started cleaning out and enlarging the 2500 station, where new pumps will be placed.

Mexican—The mill has been brought up to its capacity, and a higher percentage of extraction has been recorded. Bullion shipments this month are expected to clear the company entirely of indebtedness.

ESMERALDA COUNTY

C. O. D. Consolidated—A new discovery has been made in virgin ground on the 100-ft. level about 50 ft. easterly from the shaft, and it is believed to be the extension of an orebody opened several years ago by leasers on the surface but subsequently lost by a surface fracture.

Florence—Approximately 150 tons of ore, averaging $150 per ton, have been shipped from the new strike on the 250-ft. level, since about a month ago. All ore extracted in any part of the mine that returns an assay less than $100 per ton is being stored in such stopes for the present. Superintendent Dewey estimates the value of the entire tonnage of such stored ore at $200,000 at present.

EUREKA COUNTY

Windfall Mining Co.—Superintendent George Edwards, of this company near Eureka, has bonded from Senator Sweeney and others, a silver-lead-zinc property in the Mount Hope mining district, about 28 miles north of Eureka. It is expected that Salt Lake men will operate the property with a steam shovel.

Nevada Central Copper Co.—The Fort Wayne electric drills recently received are working well and the management is preparing to ship ore.

HUMBOLDT COUNTY

There has been a gold strike about 25 miles northeast of Winnemucca, on the east side of Paradise Valley. The formation is a sugar quartz.

An important lawsuit is now going on between two companies in the National district over the apex of the main vein of the National Mines Co. Considerable money is involved. H. V. Winchell is the geologist, and L. G. Campbell and Judge Dickerson are the leading attorneys. The mine has lately found a vein of rich ore on the 800-ft. level.

Kramer Hill—This property near Golconda is being operated steadily; there is a small mill and the ore averages about $8 per ton.

NYE COUNTY

Shipments in tons from Tonopah mines to date and for the week ended June 13, are as follows:

Mines	Week	Year to Date
Tonopah Mining	3,550	79,469
Tonopah Belmont	2,050	48,926
Montana-Tonopah	1,090	24,429
Tonopah Extension	1,010	23,177
West End	700	16,964
Midway	.....	180
MacNamara	465	8,660
North Star	.....	80
Totals	8,865	201,885
Estimated value	$221,625	.....

Manhattan Big Four—The company has decided to erect a mill on its property the plans for which have been drawn by J. C. Wilkinson; of Goldfield. The mill will comprise 10 stamps of 1050 lb., two tube mills, 16x5 ft., and amalgamating tables.

Philadelphia—This Manhattan custom mill, of 10 stamps of which C. R. Logue is manager, will install a complete cyanide plant.

Associated Milling Co.—This Manhattan company, of which Charles Kirchen is manager, contemplates increasing the capacity of its plant by the addition of five stamps and another tube mill.

Montana-Tonopah—In a statement accompanying Dividend No. 6 the profits for the first five months of this year are reported at $135,634, and the June profits are estimated at $30,000. The cash balance is $171,470, and the company also owns the control of the Commonwealth mine at Pearce, Ariz., which it is now developing.

Mizpah Extension—In a raise from the east drift on the 1000-ft. level the company has opened 3 ft. of specimen ore showing native silver, stephanite and black sulphides. This is believed to be the eastern extension of one of the Belmont veins.

New Jersey

Alpha Copper Co.—The real estate and personal property of this copper company, consisting of 1200 acres of land, mining plant and mines, situated in the Watchung Mountains, three miles north of Somerville, have been sold at sheriff's sale, subject to a mortgage held by the Manhattan Trust Co., of New York, of $315,000, and one held by the Camden Safe Deposit Co., for $2500. The property was bought by George H. Gardner, of New York, for $5000. The mine was first opened nearly a century ago and has been worked at intervals by several different companies.

New Mexico

Socorro County

Socorro—Approximately 45,000 oz. of gold and silver bullion and 25 tons of high-grade concentrates were produced in May.

Deep Down—An average of 15 tons per day is being sent to the Deadwood mill from the south stope, under lease.

Treasure—The recent fire, which consumed the old orebins, caused but little delay in ore-hauling, new ones being erected in a short time. The mill was able to run continuously, having a considerable tonnage in reserve. The regular daily delivery of 70 tons is being made.

North Carolina

Cleveland County

The old sulphur mine, nine miles north of Kings Mountain, has been purchased by a coal company, and it will be put in operation as soon as the machinery, which has already been shipped, can be installed.

American Gold Mine Co.—This company recently purchased the Logan gold mine, south of Kings Mountain. New machinery is being installed and the plant will soon be ready for operation. H. A. Beard, of Battle Creek, Mich., is interested.

Oregon

Douglas County

Oregon-Colorado—F. J. Hard, manager of this property, is making arrangements to install a smeltery for treating the copper ore that has recently been blocked out. A vertical depth of 900 ft. has been obtained.

Lane County

Star Consolidated—This property owned by Portland, Oregon men, is to be sold to Los Angeles men who will open the tunnels long idle. A 5-stamp Allis-Chalmers mill is in good condition.

South Dakota

Black Hills District

Columbus Consolidated—In the *Journal* of June 8, it was stated that judgments against this property must be redeemed before Oct. 5; otherwise the property would pass to J. T. Milliken, president of the Golden Cycle Mining Co., of Colorado. Mr. Milliken has informed us that he has not acquired, either directly or indirectly, any of the obligations of the Columbus Consolidated company.

Homestake—The company will add five motors to the electrical equipment in its mines. These will consist of one 10-, two 15- and two 25-hp. motors, and will be furnished by the General Electric Company.

Utah

Juab County

Tintic shipments for the week ended June 14 amounted to 179 cars; for the week ended June 7, 171 cars.

Iron Blossom—No. 1 shaft, damaged by caving, is in first-class condition. Ore marketed recently brought in about $15,000.

Uncle Sam—At the annual meeting it was reported that there is a quantity of zinc ore in the mine, which can be shipped to the Oklahoma market at a profit.

Colorado—Crosscutting is being done from the Crown Point shaft to explore this mine at depth. Work has been resumed in the old tunnel started west several years ago before ore was encountered.

May Day—An increasing tonnage of zinc ore of shipping grade is being opened. This ore carries 15% zinc, and is being followed in search of a commercial body. Representatives of an eastern zinc company recently made an examination of the mine.

Dragon Consolidated—A raise from the 300-ft. level of the Star workings has broken into 3 ft. of ore carrying silver and copper. The diamond drill to be used in prospecting the south end of the property is ready for operation. The drilling operations are being conducted on company account. A tunnel has been started near the company's main shaft, from which shipments of iron ore were taken.

Utah Ore Sampling Co.—This company's plant at Silver City has put on a night shift as the business has been increasing for several months. About 800 tons per day are being sampled.

Beck Tunnel—The output for a recent week was 100 tons. The best showing is in the ground adjoining the Uncle Sam. Ore is being found on the 175-ft. level. The annual report showed that 1816 ft. of development work were done during the year; 42,041 tons of ore were mined and marketed, bringing net returns of $46,051. The company reduced its indebtedness $15,000.

Shoebridge—The lease on the old mill dump by H. F. Gear, has nearly expired. Since the beginning of the lease 31 cars have been shipped. The dump is said to have brought from $3 to $4 per ton.

Swansea Consolidated—From May 16 to June 8, this company shipped ore which brought $13,000 net. The average of daily shipments is about 75 tons, valued at about $7 per ton. The north drift on the 940-ft. level has followed ore 200 ft. from the winze. Mining will soon be started on the 800. Somewhat heavier pumping has been required during the present month.

Opohongo—A raise from the 1000-ft. level has broken through into the workings made when the property was being developed through the Black Jack. Four cars of ore per week are being shipped, averaging about $1100 per car.

Tintic Mining—This company's shaft at Mammoth is down 200 ft., and is sinking at the rate of 5 ft. per day. The work is being done in search of the Gold Chain orebody.

Salt Lake County

Ohio Copper Co.—A plan for reorganization has been made, providing for the formation of a new company, to acquire all assets and properties of the old company, subject only to the lien of $1,250,000 bonds outstanding. The capitalization will be $8,000,000 in 1,600,000 shares, par $5. Old stockholders can subscribe for new stock, share for share by payment of $1 per share; 250,000 shares will be set aside for conversion of bonds and not more than 39,000 shares can be utilized for underwriting. The board of directors is said to include W. A. Allison, John C. Montgomery, J. Fred Pierson, Jr., J. A. Heinze and Stanley Gifford.

Daly West—Regular mill operations will be resumed soon. The plant has been tested and found to be in good order. One shift will be worked at present. There is developed a sufficient quantity of milling ore to keep the plant busy for several months. While mill operations were suspended a steady production of shipping ore was made.

Silver King Consolidated—Galena ore has been opened in a winze sunk on the Jewell vein from the 1550 level. Drifting will be done on the ore.

Telegraph—Work has been resumed and 40 men are employed. About 100 tons per day of copper-iron ore are being mined with one shift.

Tooele County

Ophir Consolidated—This company, at Ophir, will make additions to its electrical equipment, consisting of one 50-hp., three 35-hp. and one 15-hp. motors, and three 50-kv.-a transformers. This apparatus will be supplied by the General Electric Company.

Washington

Stevens County

Redwood Copper Co.—Development has been underway for some time and includes 400 ft. of tunnel, 183 ft. of winze near the breast of the tunnel, and 165 ft. of raising, for ventilating. The objective point is a limestone contact, estimated to require about 100 ft. more of sinking and from 100 to 200 ft. of drifting. From surface indications, it was expected copper would be found but the adjoining mine, has opened silver-lead

ore at greater depth. Operations ceased Apr. 1, but are expected to resume soon. William E. Albee, 608 Phœnix Building, Minneapolis, Minn., is secretary.

Canada

ONTARIO

Canada Union Furnace Co.—Work has been started on the construction of the plant of this company, Port Colborne, Ont., contracts having been let involving an expenditure of about $500,000. The total cost will be in the neighborhood of $2,000,000. The plant is expected to be ready for operation by the end of the year.

Canada Cement—F. P. Jones, of this company, is leaving for the West, to complete plans for the new $1,000,000 cement plant, to be built at Medicine Hat.

ONTARIO—COBALT

Shipments of ore and concentrates, in tons, from Cobalt for the week ended June 21, and for the year to date, are:

La Rose	.....	1,577.25
Coniagas	41.21	1,000.26
O'Brien	.....	294.49
Right of Way	.....	148.60
Chambers-Ferland	.....	225.60
McKinley-Darragh	.....	1,233.55
Nipissing	.....	985.58
Hudson Bay	.....	344.22
Buffalo	30.92	613.39
Crown Reserve	.....	236.11
Cobalt Townsite	112.00	736.56
City of Cobalt	.....	145.84
Trethewey	.....	241.04
Colonial	.....	41.60
Kerr Lake	.....	350.03
Cobalt Lake	32.15	277.54
Drummond	20.74	339.30
Temiskaming	64.10	586.92
Beaver	.....	187.89
Wettlaufer	.....	111.21
Provincial	.....	22.22
Casey Cobalt	.....	68.35
Totals	301.13	9,363.17

Bullion shipments in ounces

Nipissing	18,914.4	1,760,371.21
Buffalo	9,034.0	47,972.00

Dominion Safety Explosives Co.—The Coleman Township council has granted permission to this company, organized by Sir Henry Pellatt and other Toronto men, to erect a plant about three miles from Cobalt, between Mud and Sharpe Lakes, for the manufacture of dinitrolite.

Lumsden—High-grade ore has been encountered in the underground workings.

Temiskaming—The output for the first six months of the present year amounted to 1,000,000 oz., as compared with 1,250,000 oz. for the 12 months of 1911.

Buffalo—During the last year there was a small decrease in the total production over the previous year. The total silver produced amounted to 1,525,262 oz. There was no decrease in the ore reserves for the year. The mill treated 46,801 tons, averaging 32.25 oz. and the recovery was 80.63%. The cash surplus is now $385,577.

Crown Reserve—A statement for the five months ended May 31, shows a gross production of 1,143,142 oz. Net surplus was $52,889 after the payment of $442,203 in dividends. Total surplus, May 31, was $817.741.

Cobalt Lake—Good ore has been encountered in the crosscut on the 225-ft. level.

Nova Scotia—This mill will resume operations. It has been closed for some time, owing to the company having assigned.

Calcite Lake—An order winding up this company has been granted by the court, at Toronto; E. R. C. Clarkson, Toronto, was appointed liquidator.

Trethewey—A statement as of May 31 showed: Cash in banks and due from smelteries, $147,221; ore ready for shipment and in transit, $55,820; total, $203,041. The mine's production for May was about 60,000 oz.; gross profit, $36,000; expenses, $16,000; net profit, $20,000. A ballot paper has been sent to the shareholders to give them an opportunity to vote as to whether 1,000,000 shares in the treasury should be cancelled, or retained for the purpose of acquiring new properties.

ONTARIO—PORCUPINE

McEnaney—This mine is the first Porcupine property on which free gold has been found on the 300-ft. level. The vein is about 5 ft. wide and gives good assays.

Bewick, Moreing & Co.—It is stated that this company will resume work on its property adjoining the North Dome.

North Dome—Free gold has been encountered on the 50-ft. level.

Plenaurum—Recent development work has been encouraging.

Dome—Sinking will soon be started from the 100-ft. level of No. 2 shaft. The management expects to treat 10,000 tons per month in the mill.

Hollinger—Ten stamps have been started in the mill. It is expected that they will all be dropping in a few days.

Mulholland—The main shaft is down 200 ft., and crosscutting to pick up the vein is in progress.

Swastika—The vein has been cut in the crosscut on the 400-ft. level. The company is considering the erection of a mill.

Alexo—This nickel property, situated about four miles from Kelso, will soon start shipping to the Mond Nickel Co. The production will be one car per day. A tramway is being built to connect the mine with the siding.

Moneta—No. 1 shafthouse was destroyed by fire, June 15, stopping underground work temporarily in one drift.

Porcupine Gold—The mill is only partially in operation, owing to delay in receiving the motor. The crusher and one ball mill are handling a small tonnage.

Canadian Finance & Exploration Co.—The stock has been oversubscribed. After June 20 the company will be ready for business.

Standard—This property has been permanently closed down.

Dome Extension—Prominent Philadelphia men are negotiating for the control of this company.

McIntyre—Good ore has been encountered in the north crosscut on the 200-ft. level.

Mexico

SONORA

Empire—Work is reported to have been resumed at the Major Domo mine of this company, in charge of B. Bound. Machinery has been purchased and will be installed soon.

Santa Rosalia—The mine is expected to be in operation again soon. W. J. Edwards, of Cananea, representing the company, was recently at the mine. A Michigan man is expected to take charge.

San Nicolas—Good gold and silver ore is said to have been found recently. A leasing company is operating the mine, which is in charge of Frank Bergesen.

Cuba

Ponupo Mining Co.—It is reported that the property at La Maya, near Santiago, was burned recently by a rebel band.

Africa

TRANSVAAL

Gold production in May is reported at 779,662 oz., being 42,002 oz. more than in April, and 93,711 oz. more than in May, 1911. For the five months ended May 31, the total was 3,291,585 oz. in 1911, and 3,790,971 oz.—or $78,357,371—in 1912; an increase of 499,386 oz. this year.

The number of negro laborers employed in May was: Coal mines, 8460; diamond mines, 14,538; gold mines, 193,829; total, 216,827; a decrease of 3259 from April.

Asia

CHOSEN

Oriental—During April, 23,915 tons of ore were treated, yielding $138,030 gross and net $67,547. Operating costs were $69,730 and $753 were spent on improvements and development. The Kuk San Dong 40-stamp mill was hung up the full month because of shortage of labor.

South America

Breitung Mines Corporation—This company has filed articles of incorporation in Delaware, with a capitalization of $10,000,000, to operate in Central and South America. The Breitung interests identified with the Michigan iron mines are supposedly conneced with the corporation.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, June 26—Little is to be said of the coal trade this week. In the West, business is reported rather dull and very little is doing at the principal centers. Lake trade has slowed down a little and supplies at the Lake ports seem to be rather limited, so that vessels are going up light. The Seaboard bituminous trade is quiet—even more so than usual at this season. Coastwise business is dull and Eastern buyers are not fairly in the market so far.

Anthracite business is looking up a little in the domestic sizes, dealers apparently being anxious to save the 10c. which goes off the discount on July 1. Steam sizes are in fair demand, but with no special rush. The collieries are working a little better, but are hardly yet up to full capacity, and there is not much coal going to the storage yards.

Coastwise shipments of coal from the leading Atlantic ports, four months ended Apr. 30, in long tons:

	Anthracite	Bituminous	Total
New York	5,340,283	3,841,990	9,182,273
Philadelphia	622,055	1,370,065	1,992,120
Baltimore	69,227	1,250,087	1,319,314
Newport News	.....	972,425	972,425
Norfolk	.....	1,639,385	1,639,385
Total	6,031,565	9,073,952	15,105,517
Total, 1911	6,355,083	8,551,036	14,906,119

Total increase this year 199,398 tons, or 1.3%. New York covers all the harbor shipping points and includes barge shipments to city and neighboring wharves. Shipments include bunker coal.

Coal and coke carried on Pennsylvania R.R. lines east of Pittsburgh and Erie, five months ended May 31, short tons:

	1911	1912	Changes
Anthracite	5,128,186	3,688,943	D. 1,439,243
Bituminous	16,414,271	18,956,936	I. 2,542,665
Coke	4,452,114	5,340,912	I. 888,798
Total	25,994,571	27,986,791	I. 1,992,220

The total increase this year was 7.7%. The loss in anthracite was due to the suspension of mining.

Coal Rates—On the complaint of the Marion Coal Co., the Interstate Commerce Commission decided, in Washington, June 21, that the rates charged by the Delaware, Lackawanna & Western R.R. on anthracite from the Wyoming field to the tidewater terminal at Hoboken were excessive. Reductions were ordered on prepared sizes from $1.58 a ton to $1.33; on pea coal, from $1.43 to $1.24, and on buckwheat coal, from $1.28 to $1.09. The new rates are to become effective on Aug. 15 and remain in effect for at least two years.

Further reductions in freight rates on bituminous coal from the Pittsburgh district to Great Lakes ports were denied by the commission. The Pittsburgh Coal Co. and John W. Boileau wanted the commission to increase the reductions it made on Mar. 11, from 88 to 78c. a ton, in order to remove alleged discriminations in favor of West Virginia coal.

Iron Trade Review

New York, June 26—The near approach of midsummer has not brought about any considerable change in the iron market. Business remains active with heavy specifications and most of the mills are still busy.

The finished-steel market is likely to be very quiet in July and August, but as the mills are practically filled up for almost their full output in the next two to four months this is not likely to produce any weakness. Prices are quite firm all along the line, and in some quarters are showing a hardening tendency. For several weeks the opinion has been expressed in responsible quarters that bars, plates and shapes would probably advance $1 a ton before long and while no advance has actually occurred the prospect remains, and may develop into an actual advance after the conventions are out of the way. During the convention excitement the mills have not felt like taking any serious steps.

In pig iron in Eastern territory, some large orders have been placed for foundry iron and a number of inquiries have been received. Prices are rather firmly held, but do not advance. There is a renewal of interest in basic pig with many inquiries and some contracting at small advances, both in the East and the West.

The coke situation is still unsettled. The coke makers are still asking higher prices for spot and for new contracts, which furnace-owners are unwilling to concede. Until prices are more settled, business will be irregular.

The labor situation is a sore spot in the trade. There is some scarcity of labor, while uneasiness and discontent are widely manifest. There have been several small strikes in different places and settlement seems difficult. Some of the blast furnaces in eastern Pennsylvania have advanced wages 10%, but others are slow to follow.

The taking of testimony in the Steel Corporation suit of the government has been adjourned till September.

Baltimore

June 24—Exports for the week included 215,250 tons pig iron to Leith, Scotland. Imports included 22,750 tons iron ore from Cuba.

Birmingham

June 24—Confidence is expressed on all sides in Southern territory that the pig-iron market will take on activity again in a few weeks. There is yet some iron to be sold for delivery during the third quarter of the year. Prices range around $11.25 per ton, No. 2 foundry. Reports that concessions are being made on that price are not to be verified, the $11.25 quotation being considered the minimum. Some manufacturers are expressing the belief that $11.50 will be the minimum and $12 the general quotation before long. The manufacturers have lost no courage because of the temporary quietness. There has been further reduction in the accumulated stocks of iron; in fact, but one company now has iron in its yards attracting any attention. One furnace is scheduled to go into blast this week and two others during the first part of July. With iron at $12 per ton it is estimated there will be a material improvement in the make.

The appointment of receivers for the Alabama Consolidated Coal & Iron Co. by the Court of Chancery at Trenton, N. J., last week—Harrison S. Matthews, of Birmingham; Halsey W. Barrett, of Newark, N. J., and Harry Coffin, of Birmingham, being named—did not cause any surprise. The application for receivers was made by the American & British Manufacturing Co., of New York, alleging insolvency. Harrison Matthews, one of the receivers, who has been in general charge of the corporation, announced in Birmingham that the receivership will be temporary, and will clear the way for the reorganization and financing of the company whereby $2,500,000 in cash will be obtained for improvements as recommended by experts who recently reported on the property for Eastern interests. The statement from Mr. Matthews includes the assertion that Charles M. Schwab, head of the Bethlehem Steel Co., is one of the large capitalists who will become interested in the Alabama properties.

By Telegraph—A petition in involuntary bankruptcy has been filed in the Federal court here by local creditors

against the Alabama Consolidated Coal & Iron Co. and Judge Grubb, after hearing arguments presented by attorneys for the creditors, named Harry W. Coffin and W. E. Leake as receivers. Objection being raised, Judge Grubb did not appoint Harrison S. Matthews as the third receiver. The petition for the bankruptcy was filed by local creditors on accounts amounting to $15,000. While it is admitted that the proceedings in the court here are ancillary to the New Jersey receivership, it is contended by attorneys for the creditors that the receivers appointed by the New Jersey court can have no authority over property in Alabama and that the first proceedings instituted, with the consent of the company amount to nothing more than "paper receivership." One consequence already of the financial embarassment was the refusal of men in mines near Gadsden to continue at work which resulted in the shutting down of furnaces at that place.

Chicago

June 25—Sales of the leading lines of iron and steel products continue good. The demand for pig iron has fallen off, apparently into the dullness of midsummer business. Prices of pig iron, in all grades, continue firm and there seems no prospect that they will decline.

The sales of pig iron that are made are of small lots—a carload to 500 tons chiefly—and there are few inquiries for larger lots. Occasionally a small lot is bought for last-half delivery; more frequently the demand is for quick delivery. Small purchases, often, seem to be the desire of the average melter. Northern No. 2 iron brings $14.50@15 at furnace and Southern No. 2 sells for $11@11.50, Birmingham, or $15.35@15.85, Chicago. At these prices Northern is more largely in demand, but Southern is strong. Lake Superior charcoal sells for $15.75@16, in small lots.

Railroad purchases are fair; the demand is chiefly in track fastenings, but here and there a new purchase of standard rails adds to the large tonnage on which the mills are working. Structural material sales have a large aggregate in business widely distributed and this buying forms such a steady and large total that its activity seems destined to keep up all summer. Material under 15 in. continues at 1.43c. Plates are in heavy demand at 1.43c. for ¼-in.; tank plates and sheets also are in large demand, at unchanged prices. Billets continue scarce at $28 for openhearth forging.

Cleveland

June 24—Ore movement down the Lakes is heavy, but is all being handled by contract boats.

Pig Iron—Sales are good and inquiries continue to come in. Quotations are, for Cleveland delivery, $15.15 for bessemer $13.75 for No. 2 foundry, $13.25 for gray forge and $16 for Jackson County silvery.

Finished Material—Mills are all busy and in some lines deliveries are rather behind. In sheets, plates and bars deliveries on new orders are not promised before August; in structural shapes even a longer delay is wanted. Bar iron has been $1 per ton to 1.30c. Cleveland.

Philadelphia

June 26—The pig-iron market shows few large sales, but a good many small orders, which make up a fair aggregate for the week. The only call for iron in a large way is from the pipe foundries. Forge iron has dragged. Basic is inquired for on a good scale. No. 2X foundry may be quoted $15.25@15.50 and forge $14.50@14.75; while $15.25 is asked for basic iron.

Steel Billets—Lots of 500 tons or so are wanted, but no big business. Mills are full and ask $23.40@24.40 for rolling and $28.40 for forging billets.

Bars—Iron bars are wanted mainly in small lots to fill up stocks. Iron bars are firm at 1.30@1.35c., while 1.35c. is named for steel bars.

Pipes and Tubes—Tubes are strong. Pipes a little quieter than they have been.

Sheets—Mills are full and small orders are coming in steadily.

Plates—More new orders are coming in and mills are rushed. Prices are strong, 1.40@1.45c. being obtained.

Structural Material—Some large business is pending and small orders are plenty. The market is firm, and prices steadier, at 1.40c. on large orders and 1.45c. on small business.

Scrap—Supplies are good and demand not pressing, but dealers are inclined to sit tight on prices.

Pittsburgh

June 25—The iron and steel market has assumed a quieter aspect but has lost nothing of its strength. New buying is lighter, and specifications are perhaps a trifle lighter, except in the case of contracts expiring with the month, specifications on such contracts being quite heavy. The total of specifications for finished steel received this month will probably make a new monthly record for the year, as several mills can already clearly foresee such a result.

Pig Iron—A sale of 2000 tons of malleable for third quarter is reported at $13, Valley, which represents the minimum of the market, extended delivery having sometimes brought $13.25. Foundry iron is still available on the basis of $13.25, Valley, though in rather limited quantities. The purchase of basic iron by the Carbon Steel Co., Pittsburgh, referred to last week, proves to have been at $13.25, Valley, for equal deliveries over second half, involving 7500 tons or more, and the basic market is now firm at that figure as a minimum, the $13 price for prompt iron having entirely disappeared. Bessemer has been quiet and not overly strong. Interest in sales and prices of pig iron yields to the question of coke supply for second half for furnaces not covered by long term or annual contracts, as the Connellsville operators persist in asking $2.50, while the furnaces are equally fixed in staying out of the market at that figure. The rival claims are wide apart, though somewhat interesting. The operators have a list of 10 furnaces which they say are about to blow in, making a very sizable increase in the coke consumption, but there is a serious question as to several of these furnaces at any rate. They also claim that the high price of copper will increase the sale of smelter coke, helping the situation, but the market fact is that smelter coke has declined lately, and is now easy at about $1.65. The argument most likely to convince is that the operators are holding $2.50 by mere force of opinion, and show no signs of weakening. The recourse of the furnaces is to use outside coke, as from West Virginia, and to buy Connellsville coke from time to time in the prompt market instead of contracting. The prompt market is now $2.15@2.20. Never before have contracts been made at much above the prompt market, though the reverse has sometimes occurred. This deadlock as to coke is probably tending to make pig iron quieter than it otherwise would be. We quote: Bessemer, $14.25; basic, $13.25; No. 2 foundry, $13.25@13.50; malleable, $13@13.25; forge, $13, all f.o.b. Valley furnaces.

Steel—The market is firm, producers being very well sold up, but is not particularly active. We continue to quote: Billets, $21.50; sheet bars, $22, f.o.b. maker's mill, Pittsburgh; billets, $21; sheet bars, $22, f.o.b. maker's mill, Youngstown. Rods are quotable at $24.50 @25, Pittsburgh.

Sheets—The sheet mills are operating at between 90 and 95 per cent. of capacity, many plants running full. Prices are slightly firmer. On contracts for extended delivery mills are regularly obtaining better prices than the rates quoted by a few mills for early shipment. Contracting by the automobile manufacturers is expected to be heavy in July, for the new season. One or two large contracts have already been placed. There is less competition on these grades of material than on common sheets, and full prices, premiums in some cases, are obtained without difficulty, consumers being willing to pay for good service. We quote: Black sheets, 28 gage, 1.90@ 1.95c.; galvanized, 28 gage, 2.95@3c.; blue annealed, 10 gage, 1.40c.; painted corrugated, 28 gage, 2.15c. per lb. and $1.35 per square; galvanized, 3.05c. per lb. and $2 and $2.56 per square

St. Louis

June 24—The pig-iron market is firm. Business is mainly in small lots, but foots up a pretty good total. Southern No. 2 foundry is $11.25 Birmingham, or $15 St. Louis, with $11.50 Birmingham asked for fourth quarter. Northern No. 2 is quoted around $14.50. Business in finished materials is good.

Coke is $5@5.10 St. Louis.

Iron Ore Trade

Sales of such Cuban iron ore as is offered in the market have been made to Eastern furnaces recently, the total being about 100,000 tons. The price for second-half delivery is said to be 7¼c. per unit, f.o.b. cars at Philadelphia. This is an advance of ¼c. on first-half contracts. Small advances are now asked on Swedish and Spanish ores generally.

Foreign Iron Trade

German Foreign Trade—Exports and imports of iron and steel and of machinery in Germany, four months ended Apr. 30, metric tons:

	Exports	Imports	Excess
Iron and steel..	1,926,473	213,596	Exp. 1,712,877
Machinery.....	161,766	26,448	Exp. 135,318
Total.....	2,088,239	240,044	Exp. 1,848,195
Total, 1911.....	1,778,614	206,542	Exp. 1,572,072

Increase in exports this year, 309,625 tons; increase in imports, 33,502 tons.

Metal Markets

New York, June 26—The metal markets have been fairly active, and generally strong, notwithstanding a break in copper prices in London.

Our market report next week will cover the period from Thursday, June 27, to Tuesday, July 2. Our average quotations for June will be reported on July 2.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold			
May 1912..	$ 4,450,899	$ 3,346,491	Exp. $1,404,408
" 1911..	6,817,149	5,014,741	Exp. 1,802,409
Year 1912..	26,225,801	19,653,285	Exp. 6,572,516
" 1911..	10,176,807	29,005,312	Imp. 18,828,505
Silver			
May 1912..	6,725,781	4,345,032	Exp. 2,380,749
" 1911..	5,054,304	3,555,842	Exp. 1,498,462
Year 1912..	28,623,028	20,384,764	Exp. 8,238,264
" 1911..	28,665,500	18,454,155	Exp. 10,211,345

Exports from the port of New York, week ended June 22: Gold, $302,600, chiefly to Argentina; silver, $882,319, principally to London. Imports: Gold, $804,084; silver, $61,847, largely from France and Mexico.

Gold—The price of gold on the open market in London remains at the usual bank level, 77s. 6d. per oz. for bars and 76s. 4d. per oz. for American coin. Most of the supplies arriving went to the Bank of England. In New York $2,000,000 gold has been taken for export to Paris, and more is expected to go.

Platinum—The market continues rather quiet, but the price remains fixed at the same point which it has held for some time. Dealers ask $45.50 per oz. for refined platinum and $48 for hard metal up to 10% iridium. The foreign market is reported steady.

Iridium—The current price for this metal is $64 per oz., New York.

Silver—The price of silver rose to 28 5/16d. in London on favorable monsoon reports but later reacted to 28 5/16d. on selling by Indian Bazaars. The market closes steady at 28 5/16d. The news as to the arrangement of the proposed Chinese loan is conflicting, but it seems probable that definite progress is being made.

SILVER AND STERLING EXCHANGE

June	20	21	22	24	25	26
New York....	61⅝	61¾	62	62	61¾	61⅛
London.....	28¾	28 5/16	28 5/16	28 5/16	28 5/16	28 5/16
Sterling Ex..	4.8750	4.8725	4.8725	4.8725	4.8725	4.8710

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver. 0.925 fine.

Exports of silver from London to the East, Jan. 1 to June 13, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India.....	£4,008,700	£2,999,800	D. £1,008,900
China.....	822,800	853,500	I. 30,700
Total.....	£4,831,500	£3,853,300	D. £ 978,200

Exports of gold from Great Britain to India five months ended May 31 were £5,651,035 in 1911, and £8,020,611 in 1912; increase, £2,369,576 this year.

Copper, Tin, Lead and Zinc

NEW YORK

June	Copper: Lake, Cts. per lb.	Copper: Electrolytic, Cts. per lb.	Tin: Cts. per lb.	Lead: New York, Cts. per lb.	Lead: St. Louis, Cts. per lb.	Zinc: New York, Cts. per lb.	Zinc: St. Louis, Cts. per lb.
20	17¼ @17¾	17.40 @17.50	45¼	4.50	4.37½ @4.42½	6.85 @6.95	6.70 @6.80
21	17¼ @17¾	17.45 @17.55	45¼	4.50	4.37½ @4.42½	6.85 @6.95	6.70 @6.80
22	17¾ @17¾	17.45 @17.50	45¼	4.50	4.37½ @7.00	6.90 @7.00	6.75 @6.85
24	17¾ @17⅞	17.25 @17.35	45⅛	4.50	4.40 @4.42½	6.90 @7.02½	6.75 @6 87½
25	17¾ @17⅞	17.25 @17.35	45⅛	4.50	4.40 @4.42½	6.90 @7.05	6.75 @6.90
26	17¾ @17⅞	17.25 @17 35	45⅛	4.50	4.40 @4.42½	6.90 @7.05	6.75 @6.90

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

June	Copper: Spot	Copper: 3 Mos	Copper: Best Sel'td	Tin: Spot	Tin: 3 Mos	Lead, Spanish	Zinc, Ordinaries
20	79⅛	79⅜	84¾	206¼	196¾	17 11/16	25¾
21	79⅛	79⅜	84¾	206	196¾	18	25¾
22	.....	.....	.....	.....	.....	.....	.....
24	77⅛	78⅛	83	206¾	197	17 11/16	25¾
25	77⅛	78	82¾	207½	198	18	25½
26	78¼	79⅛	83¾	207¾	199	17 11/16	25¾

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = ± 21¾c.

Copper—Following our last report, the market experienced a further advance on the strength of relatively small business, some electrolytic having been sold at 17¾c. for delivery in Europe, although any important demand would doubtless have been supplied at a lower price if necessary to secure the orders. Some uncertainty in the speculative position of the London market was detected as early as June 21. On June 24 there was a sharp drop as the effect of realizing sales of some large blocks of copper in the London market. The consequence of this was to create uncertainty among consumers everywhere, and they have naturally held aloof. In the meanwhile, the principal producers, who have put themselves in comfortable position and temporarily have no need to sell copper, have maintained their price previously asked, but, of course, have sold no copper, and the market during the last three days has been made by the relatively small transactions through second hands. Although the London market rallied somewhat on Tuesday and Wednesday, there was but little demand for refined copper, and buyers are disposed to proceed cautiously, in view of the high level of prices and this week's disturbance in London. The statistical position of the metal continues to be strong, and it is hoped that the increase in production which is likely to make its appearance toward the end of the summer will be readily absorbed, but, of course, there is no certainty about that. Anyway, it is recognized that the consumption of copper, both in this country and in Europe, at the present time is already very large. At the close, Lake copper is quoted 17⅜@17⅝c., and electrolytic at 17.25@17.35c. Casting copper is quoted nominally at 17@17⅛c. as an average for the week.

The London market, which on Thursday and Friday, June 20 and 21, ruled at

£79 2s. 6d. for spot and £79 17s. 6d. for three months, declined sharply on Monday, June 24, to £77 5s. for spot and £78 2s. 6d. for three months. The immediate cause was the rumor that hidden stocks of copper had been discovered, but the real cause was that for a long time past there has been bull speculation in London standard copper and large bull accounts had accumulated, not all of which were in strong hands, so that the position had become vulnerable. The market rallied somewhat on Tuesday and further on Wednesday, and closes at £78 5s. for spot and £79 2s. 6d. for three months.

Copper sheets are 22@23c. per lb., base for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 19@19¼c. base, carload lots at mill.

Copper exports from New York for the week were 4524 long tons. Our special correspondent reports the exports from Baltimore at 831 tons.

Tin—The position continues to be an extraordinary one. The London strike is not yet settled, although it has been running for almost a month, and there are several thousand tons of tin in vessels at London which cannot be discharged. During the past week some of this tin has been reshipped to the continent, whence it is being forwarded to the United States, and shipments from the East Indies are now being made to continental ports, so that the squeeze on this side will not extend much further. In the meantime, however, tin for spot delivery continues to command a premium of 2½ to 3c. per lb. over shipment tin. Under these circumstances, American consumers have been restricting their purchases to a minimum and in consequence, notwithstanding the small supplies, the price of spot tin has not gone over 48¾ cents.

The market in general has been firmer, London closing at £207 15s. for spot and £199 for three months.

At New York the price for June delivery has ruled about 48¼@48½c. and for July tin 45¼@45½c. The market closes at 48½c. for spot and 45½c. for July.

Receipts of Bolivian tin in Great Britain in May included 16 tons of bars and 1463 tons concentrates, equivalent to a total of 894 tons fine tin.

Lead—Consumption of pig lead is improving and there is a good business doing. Lead in New York is unchanged at 4.50c. Lead in St. Louis has been somewhat easier at 4.37½ to 4.42½ but the market closes at 4.40 to 4.42½ cents.

The London market continues strong, Spanish lead being quoted £17 18s. 9d. and English lead 2s. 6d. higher.

Spelter—The market is very strong. Stocks in the hands of producers and consumers are low and consumption is increasing. The outlook in the galvanizing trade is excellent. Prices are higher, the close being quoted 6.75@6.90c. according to delivery; New York 6.90 to 7.05 cents.

The London market is unchanged at £25 15s. for good ordinaries and £26 for specials.

Other Metals

Aluminum—Business has not been specially active. We continue to quote 22½ @23c. per lb for No. 1 ingots, New York.

Antimony—Business is chiefly of a retail order, with prices unchanged. Cookson's is quoted at 8.10c. per lb.; Hallett's is 7.75c.; while 7.10@7.25c. per lb. is quoted for Chinese, Hungarian and other outside brands.

Quicksilver—Business has been quiet, and prices are unchanged, though rather nominal. New York quotations are $41 per flask of 75 lb., with 60c. per lb. charged for retail lots. San Francisco, $41 for domestic orders and $38.50 for export. The London price is £8 5s. per flask, with £8 2s. 6d. quoted from second hands.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Bismuth—The syndicate which controls the European production quotes 7s. 6d.—equal to $1.80—per lb. in London. In New York a quotation of $1.72 per lb. is made for metal produced from American ores.

Cadmium—The latest quotation received is 700 marks per 100 kg., f.o.b. works in Silesia, Germany. This is equal to 75.6c. per lb., at works.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, five months ended May 31, figures in long tons, except quicksilver, which is in pounds:

Metals	Imports	Exports	Excess
Copper, long tons	50,389	22,859	Imp. 27,530
Copper, 1911....	63,250	33,893	Imp. 29,357
Tin, long tons....	18,878	18,821	Imp. 57
Tin, 1911.....	17,360	19,537	Exp. 2,177
Lead, long tons..	91,221	21,937	Imp. 69,284
Lead, 1911.....	86,467	28,149	Imp. 58,318
Spelter, l'g tons..	57,053	3,733	Imp. 53,320
Spelter, 1911....	54,508	4,272	Imp. 50,236
Quicksilver, lb...	2,384,648	939,645	Imp. 1,445,003
Quicksilver, '11	2,210,799	1,262,733	Imp. 948,066
Minor met's, tons	2,356	11,484	Exp. 9,128
Minor, 1911.....	2,323	8,717	Exp. 6,394
Ores			
Tin ore and con.	12,019	.....	Imp. 12,019
Tin ore, 1911...	12,050	.....	Imp. 12,050
Pyrites.....	388,043	.....	Imp. 288,043
Pyrites, 1911...	395,274	.....	Imp. 395,284

Copper totals include metallic contents of ore and matte. Exports include re-exports of foreign material. Minor metals include nickel, aduminum and the minor metals and alloys.

Copper, Tin, Lead and Zinc

Joplin, Mo., June 22—The high price of zinc sulphide ore this week was $61.50, the base per ton of 60% zinc is $52@58. Zinc silicate sold at $28@30 per ton of 40% zinc. The average price, all grades, was $54.30. The zinc-ore market slumped $2 per ton on the low grades, but only 50c. on the high grades. Competition was not so strong this week, several companies being out of the market and others with short orders. Production was off from 700 to 1000 tons, on account of the heavy rains and flood of last Sunday night.

SHIPMENTS, WEEK ENDED JUNE 22

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	4,285,160	.....	1,230,400	$154,435
Joplin.....	2,048,510	.....	250,900	65,281
Galena.....	648,620	53,290	42,430	20,104
Duenweg.....	644,800	.....	27,050	18,784
Alba-Neck....	570,120	.....	.....	16,533
Oronogo.....	411,630	.....	.....	11,086
Spurgeon	252,620	273,560	.....	10,923
Granby	98,370	312,070	6,000	7,890
Cave Springs.	256,000	.....	12,380	6,990
Miami.....	211,760	.....	.....	5,082
Aurora.....	111,410	.....	.....	2,896
Carthage	72,470	.....	.....	1,956
Lawton.....	66,000	.....	.....	1,782
Springfield ..	61,130	.....	.....	1,711
Wentworth...	.....	.....	30,640	788
Totals.....	9,738,600	638,920	1,599,800	$326,241
25 weeks...	253,084,770	15,241,430	43,007,910	$7,740,457
Blende val., the week, $271,602;			25 weeks,	$6,344,376
Calamine, the week,	10,152;		25 weeks,	224,792
Lead value, the week,	44,487;		25 weeks,	1,171,289

MONTHLY AVERAGE PRICES

Month	Zinc Ore				Lead Ore	
	Base Price		All Ores		All Ores	
	1911	1912	1911	1912	1911	1912
January.....	$41.85	$44.90	$40.55	$43.54	$55.68	$58.92
February....	40.21	45.75	39.16	43.31	54.46	52.39
March.....	39.85	51.56	38.45	49.25	54.57	54.64
April.....	38.88	52.00	37.47	50.36	56.37	54.18
May.....	38.25	55.30	36.79	53.27	55.21	52.45
June.....	40.50	.....	38.18	.....	56.49	.....
July.....	40.75	.....	38.36	.....	58.81	.....
August.....	42.50	.....	41.28	.....	60.74	.....
September..	42.63	.....	41.29	.....	59.33	.....
October.....	42.38	.....	40.89	.....	54.72	.....
November...	45.40	.....	43.25	.....	57.19	.....
December...	44.13	.....	40.76	.....	62.03	.....
Year.....	$41.45	.....	$39.90	.....	$56.76	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Platteville, Wis., June 22—The base price paid this week for 60% zinc ore was $56. The base price paid for 80% lead ore was $54@55 per ton.

SHIPMENTS, WEEK ENDED JUNE 22

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	878,170	.....	.....
Shullsburg.....	803,500	.....	.....
Benton.....	788,600	.....	692,000
Galena	602,400	.....	.....
Platteville.....	567,300	74,110	233,300
Hazel Green.....	350,000	.....	.....
Highland.....	316,300	.....	.....
Rewey.....	169,000	.....	.....
Harker.....	167,110	.....	.....
Cuba City.....	65,280	64,850	.....
Potosi.....	.....	50,000	.....
Total.....	4,707,660	188,960	925,300
Year to date.....	99,122,260	4,023,470	13,987,470

Shipped during week to separating plants, 2,044,910 lb. zinc ore.

Other Ore Markets

Zinc Ores—For Rocky Mountain blende of good quality, especially as to iron and lead contents, the current price, delivered at smelting works in Kansas and Oklahoma, is for the zinc contents, less eight units at the St. Louis price for spelter; with a deduction of $16 to $18 per 2000 lb. of ore.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. of ore containing 60 per cent. of tungsten trioxide. For scheelite ore, 50c.@$1.50 per unit less. These prices are delivered; a recent offer is noted of $5.50 per unit for huebnerite, 60% WO_3 f.o.b. railroad.

Vanadium Ore—A recent quotation for vanadinite, containing at least 10%, is 75c. per lb. for the V_2O_5 in the ore.

Molybdenum Ore—Recent prices offered for molybdenite, carrying 25% MoS_2, are $25 per ton; for wulfenite, at least 25% MoO_3, $100 per ton, f.o.b. railroad.

New Caledonia Ores

The final corrected statements for 1911, as given by the *Bulletin du Commerce*, of Noumea, report the exports from New Caledonia as follows, in metric tons:

Ores:	1910	1911	Change
Nickel	115,342	120,060	I. 4,718
Copper	800	.....	D. 800
Lead	44	.....	D. 44
Chrome	28,244	32,806	I. 4,562
Metals:			
Nickel matte	768	2,993	I. 2,225
Copper matte	.....	1,529	I. 1,529
Iron, blooms	.....	4	I. 4

Of the nickel ore exported in 1911 there were 54,709 tons to England; 40,247 to France; 17,904 to Germany and Holland; 7789 to Belgium. Of the chrome ore 6401 tons went to the United States direct; 5775 to Italy; 1500 to France; 491 to Holland. The balance, 18,741 tons, went to Australia, for transfer there to other vessels.

Chemicals

New York, June 26—The general markets are rather dull.

Arsenic—Some shipments are being received from Canada; also from Anaconda. English arsenic is also arriving. Trade has been good and spot parcels are pretty well cleared up. Spot white arsenic is easier, at $3.75 per 100 lb., while $3.62½ per 100 lb. is asked for futures.

Copper Sulphate—The market is quiet, but steady. Quotations are unchanged at $5.50 per 100 lb. for carload lots and $5.75 per 100 lb. for smaller parcels. Production is not large, and there may be an advance soon.

Nitrate of Soda—Trade is a little dull, but prices are firm. Spot and July nitrate commands 2.42½@2.45c. per lb., while 2.45c. is asked for August and later deliveries.

Petroleum

Exports of petroleum and petroleum products from the United States in May were 177,343,826 gal. For the five months ended May 31 the exports were 669,346,367 gal. in 1911, and 694,224,215 gal. in 1912; an increase of 24,877,852 gal., or 3.7%, this year.

Mining Stocks

New York, June 26—On June 20, the Exchange recovered somewhat from its previous quiet and sales were larger, generally at firm prices. On the Curb, mining stocks were also firm and developed a good volume of business with some advances. Braden Copper was specially active and some of the Cobalt stocks were in demand.

June 21 the Exchange was quiet again, with only small changes in price. The Curb was more active, but irregular. Ohio Copper declined, but Braden and Mason Valley gained. Other mining stocks were steady but not in much demand.

June 22 both Exchange and Curb were very dull, with little business and no changes. The Chicago convention seemed to absorb more attention than stocks.

June 24 the Exchange was still dull and uncertain, but the range of prices was perceptibly lower. On the Curb the market was rather narrow. El Paso Consolidated was lower and Yukon Gold was quiet. Cobalts were dull but steady. Copper stocks were generally off a fraction.

June 25 the Exchange was still dull and rather inclined to weakness. The Curb also was quiet, except for fair sales of copper stocks. June 26 the situation was much the same, the Baltimore convention attracting attention.

At auction, in New York, June 20, there were sold 41,000 shares Rawhide Coalition Mines Co., at $15 for the lot.

Boston, June 25—The mining-share market was just getting into its own when the sharp break in the London copper warrants occurred on June 24. The market was going ahead with leaps and bounds and many stocks sold at their record prices for the year. Notable among these were Calumet & Hecla, which rose $28 to $539, Isle Royale $3.87½ to $35.50 and Osceola $5.50 to $130.50 per share.

The whole copper-share list indicates a tendency to draw away from the environments of Wall Street, where the political and crop influences are uppermost. Many of the recent increases in copper-mining dividends do not represent the present high level for copper, so that any continuance of this price will accrue to the mining companies. This is the foundation upon which many expect to see a board, active market.

Mayflower and Old Colony have taken on a new lease of life in response to further favorable drill developments. Six

COPPER PRODUCTION REPORTS

Copper contents of blister copper, in pounds

Company	March	April	May
Alaska shipments	4,987,916	1,243,911	1,720,391
Anaconda	25,900,000	25,480,000	25,800,000
Arizona, Ltd.	3,150 000	3,400,000	3,500,000
Copper Queen	7,197,121	6,806,425	7,024,087
Calumet & Ariz.	4,652,000	4,104,000	4,424,000
Chino	1,108,381	1,150,000	1,275,850
Detroit	2,246,238	2,506,718	2,092,478
East Butte	1,480,000	1,400,000	.....
Mammoth	1,939,310	1,718,450	.....
Mason Valley	1,140,000	1,503,056	1,520,000
Nevada Con.	6,380,000	6,115,095	6,063,462
Ohio	599,156	675,000	.....
Old Dominion	2,432,000	2,167,000	.....
Ray	2,300,000	2,611,920	2,992,500
Shannon	1,388,000	1,544,000	1,464,000
South Utah	299,000	284,215	236,884
United Verde*	2,250,000	2,250,000	2,500,000
Utah Copper Co.	8,160,000	8,615,775	9,564,919
Lake Superior*	19,750,000	18,250,000	21,250,000
Non-rep. mines*	6,792,463	7,625,000	.....
Total production	104,051,585	97,400,495	.....
Imports, bars, etc.	23,519,215	26,842,014	.....
Total blister	127,570,800	124,242,509	.....
Imp. in ore & matte	8,736,874	9,350,972	.....
Total	136,307,674	133,593,481	.....
Miami	2,755,000	2,554,352	2,565,000
Brit. Col. Cos.:			
British Col. Copper	.....	1,043,173	875,000
Granby	1,882,073	1,941,797	1,914,460
Mexican Cos.:			
Boleo	2,424,800	2,149,280	2,260,160
Cananea	2,834,000	4,654,000	4,600,000
Moctezuma	2,446,731	2,797,718	2,892,521
Other Foreign:			
Cape Cop., S. Africa	725,760	954,240	754,880
Kyshtim, Russia	.....	1,545,000	.....
Spassky, Russia	638,400	649,600	.....
Famatina, Argen.	.....	.....	.....
Tilt Cove, Newf'd.	104,992	119,869	123,087
Exports from:			
Chile	3,584,000	6,496,000	3,696,000
Australia	8,064,000	9,408,000	7,840,000
Arrivals in Europe†	12,559,680	12,064,640	9,976,860

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment ,and reappears in imports of blister.

*Estimated. †Does not include the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	United States Product'n	Deliveries, Domestic	Deliveries for Export
V, 1911	126,962,544	64,543,963	61,978,557
VI	124,554,312	61,655,561	71,460,519
VII	112,167,934	56,982,582	74,880,658
VIII	125,493,667	59,935,364	69,855,660
IX	115,588,950	57,311,584	50,824,011
X	118,255,442	64,068,307	60,084,349
XI	111,876,601	68,039,776	67,049,279
XII	122,896,697	65,988,474	79,238,716
Year	1,431,938,338	709,611,605	754,902,233
I, 1912	119,337,753	62,343,901	80,167 904
II	116,035,809	56,228,368	63,148,096
III	125,694,601	67,487,466	58,779,566
IV	125,464,644	69,513,846	53,252,326
V	126,737,836	72,702,277	69,485,945

	Visible Stocks		
	United States	Europe	Total
VI, 1911	165,995,932	202,540,800	368,536,732
VII	157,434,164	195,932,800	353,366,964
VIII	137,738,858	191,891,840	329,630,698
IX	133,441,501	191,228,800	324,670,301
X	140,894,856	191,945,600	332,840,456
XI	134,997,642	176,825,600	311,823,242
XII	111,785,188	164,281,600	276,066,788
I, 1912	89,454,695	158,323,200	247,777,895
II	66,280,643	154,851,200	221,131,843
III	62,939,988	141,142,400	204,082,388
IV	62,367,557	136,819,200	199,186,757
V	65,066,029	134,176,000	199,242,029
VI	49,615,643	117,801,600	167,417,243

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

mining companies listed in Boston have increased their rates over the amount paid last year.

On the Curb trading has increased and prices are firm. Houghton Copper has been the feature with a $3 advance to $8. Eagle & Blue Bell has been active and higher.

Assessments

Company	Delinq	Sale	Amt
Best & Belcher, Nev	June 3	June 27	$0.10
Buffalo, Mont.	June 4	July 2	0.002½
Challange, Nev.	June 8	July 2	0.10
Chollar, Nev.	July 7	Aug. 5	0.10
Confidence, Nev.	July 15	Aug. 9	0.20
Crown Point, Nev.	June 24	July 17	0.10
Ely Con., Nev.	.....	.....	0.05
Exchequer, Nev.	May 23	June 13	0.05
Glen Dale, Utah.	May 25	June 25	0.00
Great Falls, Utah.	June 26	July 27	0.002½
Hale & Norcross, Nev.	July 2	July 29	0.05
Houghton Copper, Mich.	May 17	.....	1.00
Julia, Nev.	May 15	June 5	0.05
Mineral Hill, Nev.	Aug. 5	Oct. 5	0.01
O. K. Silver Mining, Utah.	July 15	Aug. 1	0.002½
Overman, Nev.	June 29	July 23	0.10
Savage, Nev.	June 4	June 26	0.10
Segregated Belcher, Nev.	June 1	June 28	0.05
Seven Troughs, Nev.	June 15	July 2	0.002½
Sierra Nevada, Nev.	July 4	July 30	0.10
Silver Mt., Ida.	July 15	Aug. 15	0.002
South Lake, Mich.	June 3	.....	2.00
Tintic Central, Utah.	June 14	July 6	0.005
Union Consolidated, Nev.	July 12	Aug. 7	0.15
Utah Antimony, Utah.	June 1	.....	0.03
Utah, Nev.	July 12	Aug. 6	0.05
Yankee Con., Utah.	.....	.....	0.02
Yellow Jacket, Nev.	July 4	Aug. 12	0.10

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795	56.260	24.154	24.865	25.887
February	51.534	52.222	59.043	23.794	24.081	27.190
March	51.454	52.745	58.375	23.690	24.324	26.875
April	53.221	53.325	59.207	24.483	24.595	27.284
May	53.870	53.308	60.880	24.797	24.583	28.038
June	53.462	53.043	.....	24.651	24.486	.....
July	54.150	52.630	.....	25.034	24.286	.....
August	52.912	52.171	.....	24.428	24.082	.....
September	53.295	52.440	.....	24.567	24.209	.....
October	55.490	53.340	.....	25.596	24.594	.....
November	55.635	55.719	.....	25.680	25.649	.....
December	54.428	54.905	.....	25.160	25.349	.....
Year	53.486	53.304	.....	24.670	24.592	.....

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York				London, Standard	
	Electrolytic		Lake			
	1911	1912	1911	1912	1911	1912
January	12.295	14.094	12.680	14.337	55.600	62.760
February	12.256	14.084	12.611	14.329	54.974	62.893
March	12.139	14.698	12.447	14.868	54.704	65.884
April	12.019	15.741	12.275	15.930	54.034	70.294
May	11.989	16.031	12.214	16.245	54.313	72.352
June	12.385	.....	12.611	.....	56.365	.....
July	12.463	.....	12.720	.....	56.673	.....
August	12.405	.....	12.634	.....	56.266	.....
September	12.201	.....	12.508	.....	55.253	.....
October	12.189	.....	12.370	.....	55.170	.....
November	12.616	.....	12.769	.....	57.253	.....
December	13.552	.....	13.768	.....	62.068	.....
Year	12.376	.....	12.634	.....	55.973	.....

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255	42.529	July	42.400	.....
February	41.614	42.962	August	43.319	.....
March	40.157	42.577	September	39.755	.....
April	42.185	43.923	October	41.185	.....
May	43.115	46.053	November	43.125	.....
June	44.606	.....	December	44.655	.....
			Av. Year	42.281	.....

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483	4.435	4.334	4.327	13.009	15.619
February	4.440	4.026	4.266	3.946	13.043	15.738
March	4.394	4.073	4.238	4.046	13.122	15.997
April	4.412	4.200	4.262	4.118	12.889	16.331
May	4.373	4.194	4.223	4.072	12.984	16.509
June	4.435	.....	4.292	.....	13.260	.....
July	4.499	.....	4.397	.....	13.530	.....
August	4.500	.....	4.406	.....	14.260	.....
September	4.485	.....	4.356	.....	14.744	.....
October	4.265	.....	4.139	.....	15.332	.....
November	4.298	.....	4.181	.....	15.821	.....
December	4.450	.....	4.332	.....	15.648	.....
Year	4.420	.....	4.286	.....	13.970	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452	6.442	5.302	6.292	23.887	26.642
February	5.518	6.499	5.368	6.349	23.276	26.661
March	5.563	6.626	5.413	6.476	23.016	26.048
April	5.399	6.633	5.249	6.483	23.743	25.644
May	5.348	6.679	5.198	6.529	24.375	25.790
June	5.520	.....	5.370	.....	24.612	.....
July	5.695	.....	5.545	.....	25.006	.....
August	5.953	.....	5.803	.....	26.801	.....
September	5.869	.....	5.719	.....	27.750	.....
October	6.102	.....	5.951	.....	27.256	.....
November	6.380	.....	6.223	.....	26.795	.....
December	6.301	.....	6.151	.....	26.849	.....
Year	5.758	.....	5.608	.....	25.281	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

Month	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90	$15.12	$14.40	$13.32	$14.75	$14.00
February	15.90	15.03	14.50	13.28	14.81	14.01
March	15.90	14.95	14.65	13.66	14.96	14.10
April	15.90	15.13	14.65	13.90	15.00	14.15
May	15.90	15.14	14.30	13.90	14.72	14.12
June	15.90	.....	14.06	.....	14.56	.....
July	15.90	.....	14.03	.....	14.53	.....
August	15.90	.....	14.00	.....	14.47	.....
September	15.90	.....	13.57	.....	14.40	.....
October	15.43	.....	13.44	.....	14.34	.....
November	14.92	.....	13.30	.....	14.25	.....
December	15.15	.....	13.10	.....	13.90	.....
Year	$15.72	.....	$13.94	.....	$14.49	.....

STOCK QUOTATIONS

COLO. SPRINGS June 25

Name of Comp.	Bid.
Acacia	.05
Cripple Cr'k Con.	.01
C. K. & N.	.17½
Doctor Jack Pot.	.05½
Elkton Con.	.63
El Paso	.97½
Findlay	.05
Gold Dollar	.17½
Gold Sovereign	.02½
Isabella	.12½
Jack Pot	.04½
Jennie Sample	.04½
Lexington	‡.02
Moon Anchor	.01
Old Gold	.03½
Mary McKinney	.71½
Pharmacist	.01½
Portland	.92½
Vindicator	.87½
Work	.01½

SALT LAKE June 25

Name of Comp.	Bid.
Beck Tunnel	.09
Black Jack	.14½
Cedar Talisman	.02
Colorado Mining	.16
Columbus Con.	.28
Crown Point	.02
Daly-Judge	5.60
Grand Central	.65
Iron Blossom	1.27½
Little Bell	.41
Lower Mammoth	.02½
Mason Valley	‡11.50
May Day	.10
Nevada Hills	‡1.95
New York	‡.04½
Prince Con	1.62½
Silver King Coal'n	‡2.50
Sioux Con.	.05½
Uncle Sam	.20½
Yankee	.10

TORONTO June 25

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7 10	Hollinger	13.00
Hudson Bay	‡70.00	Imperial	.02
Temiskaming	.41	Pearl Lake	.20
Wettlaufer-Lor.	.66	Porcu. Gold	.36
Apex	.03	Porcu. Tisdale	.01
Central	‡5.56	Preston E. D.	.04
Crown Chartered	.12	Rea	.35
Dobie	.25	Standard	‡.02½
Dome Exten.	.28	Swastika	.12
Foley O'Brien	.15	West Dome	.10

SAN FRANCISCO June 25

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.05	Belmont	10.00
Belcher	.65	Jim Butler	.65
Best & Belcher	.11	MacNamara	.24
Caledonia	1.00	Midway	.44
Challenge Con.	.12	Mont.-Tonopah	2.52½
Chollar	.02	North Star	.16
Confidence	.40	West End Con.	1.80
Con. Virginia	.54	Atlanta	.23
Crown Point	.45	Booth	.08
Gould & Curry	.02	C.O.D. Con.	.10
Hale & Norcross	.15	Comb. Frac.	.15
Mexican	2.87½	Jumbo Extension	.35
Occidental	.55	Pitts.-Silver Peak	1.10
Ophir	1.05	Silver Pick	.11
Overman	.62	St. Ives	.33
Potosi	.03	Tramp Con.	‡.01
Savage	.13	Argonaut	‡2.00
Sierra Nevada	.12	Bunker Hill	‡4.50
Union Con.	.54	Cent. Eureka	‡.50
Yellow Jacket	.40	So. Eureka	‡3.50

N. Y. EXCH. June 25

Name of Comp.	Clg.
Amalgamated	85⅛
Am. Agri. Chem.	59
Am.Sm.&Ref.,com	84¾
Am. Sm. & Ref., pf.	107½
Am. Sm. Sec., pf. B	87½
Anaconda	44
Batopilas Min.	1½
BethlehemSteelpf	69½
Chino	33¾
Comstock Tunnel	‡.10
Federal M. & S., pf.	40⅞
Goldfield Con.	4¾
GreatNor.,ore,ctf.	41½
Guggen. Exp.	60¼
Homestake	94
Inspiration Con.	19
Miami Copper	27⅛
Nat'nalLead,com.	57½
National Lead, pf.	108
Nev. Consol.	21¾
Pittsburg Coal, pf.	91
Ray Con.	21½
Republic I&S,com.	24½
Republic I & S, pf.	79½
SlossSheffi'd,com.	54½
Sloss Sheffield, pf.	100
Tennessee Copper	43¾
Utah Copper	63⅛
U. S. Steel, com.	69⅛
U. S. Steel, pf.	110½
Va. Car. Chem.	48¼

N. Y. CURB June 25

Name of Comp.	Clg.
Barnes King	‡.30
Beaver Con	.45
Braden Copper	7⅛
B. C. Copper	6
Buffalo Mines	1.40
Caledonia	¾
Con. Ariz. Sm.	1½
Davis-Daly	2 7/16
Diam'field-Daisy	9
Ely Con.	7/32
Florence	.92
Giroux	5⅛
Gold Hill Con.	⅜
Greene Cananea	10⅜
Greenwater	.05
Internat. S. & R.	124
Kerr Lake	2½
Keystone	2⅛
La Rose	3½
McKinley-Dar-Sa.	1⅜
Min. Co. of A. new	3
Motherlode Gold.	1½
Nev. Utah M. & S.	03⅜
Nipissing Mines	7⅝
Ohio Copper	⅝
Pacific Sm. & M.	1/16
South Live Oak	3¾
South Utah M. & S.	¾
Standard Oil (Old)	865
Stand'd Oil of N.J.	378
Stand'd Oil Subs.	525
Stewart	1¼
Tonopah	7⅛
Tonopah Ex.	1¼
Tri-Bullion	⅛
Tularosa	1/16
Union Mines	1/16
United Cop., pfd.	10
Yukon Gold	3½

LONDON June 26

Name of Com	Clg.
Camp Bird	£1 8s 9d
Dolores	1 10 0
El Oro	0 16 0
Esperanza	1 10 0
Mexico Mines	7 5 0
Oroville	0 4 9
Stratton'sInd.	0 3 1½
Tomboy	1 5 6

BOSTON EXCH. June 25

Name of Comp.	Clg.
Adventure	9¼
Ahmeek	‡355
Algomah	6½
Allouez	48½
Am. Zinc	32¾
Ariz. Com., ctfs.	5½
Bonanza	.46
Boston & Corbin	8
Butte & Balak	3½
Calumet & Ariz.	75½
Calumet & Hecla	530
Centennial	24½
Con. Mercur	‡.05
Copper Range	59⅞
Daly West	6
East Butte	13¾
Franklin	12¾
Granby	55
Hancock	34
Hedley Gold	17
Helvetia	1¾
Indiana	19
Island Cr'k, com.	62¾
Island Cr'k, pfd.	89
Isle Royale	34¾
Keweenaw	‡1¾
Lake	39½
La Salle	7¼
Mass	17
Michigan	‡3
Mohawk	70¼
New Arcadian	‡4¾
New Idria Quick.	‡6⅞
North Butte	31
North Lake	6¼
Ojibway	4⅞
Old Dominion	59½
Osceola	129
Quincy	93½
Shannon	15½
Shattuck-Ariz.	22⅜
Superior	47½
Superior & Bost.	2⅛
Tamarack	44
Trinity	7
Tuolumne	3⅞
U. S. Smelting	44¾
U. S. Smelt'g, pf.	50½
Utah Apex	2¾
Utah Con.	10¾
Victoria	4¾
Winona	6½
Wolverine	114
Wyandot	2¼

BOSTON CURB June 25

Name of Comp.	Last
Bingham Mines	4½
Boston Ely	1½
Boswyocolo	.03
Butte Central	6½
Cactus	.13
Calaveras	2½
Chief Cons	1⅜
Corbin	1⅛
Cortez	1½
Crown Reserve	3½
First Nat. Cop.	2½
Majestic	.56
Mazatan	‡½
Moneta Porc.	.07
Nevada-Douglas	3 1/16
New Baltic	2 1/32
Oneco	2½
Raven Copper	.29
Rhode Island Coal	.28
San Antonio	‡3
S. W. Miami	7½
South Lake	9½
Trethewey	.45
United Verde Ext.	.36
Vulture	‡5.00

‡Last quotation.

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JUL 2-1912

The Engineering and Mining Journal

Volume 93, No. 26.
Issued Every Saturday.
Hill Publishing Company.

NEW YORK, JUNE 29, 1912

Price, 15 Cents.
Advertising Index, 52.
Contents, First Reading Page.

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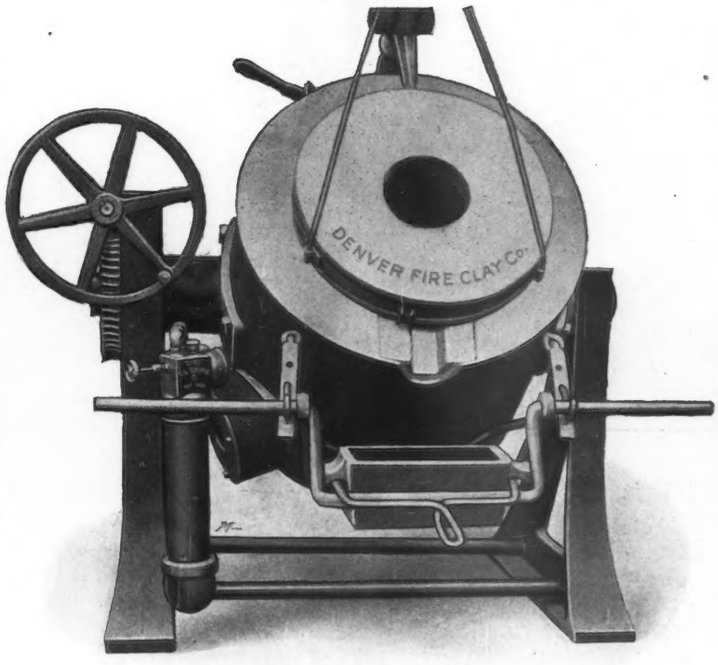


For melting Gold, Silver Nickel Cobalt Brass, Etc.

Note Bullion Mould Carrier which swings with the Furnace, thus eliminating chance of spilling the Bullion.

Operated by soft blast oil burner (4 oz.) air for same being furnished by small direct driven motor blower. Most up-to-date and economical bullion melting furnace manufactured.

Write Us Today—Department D

Made By

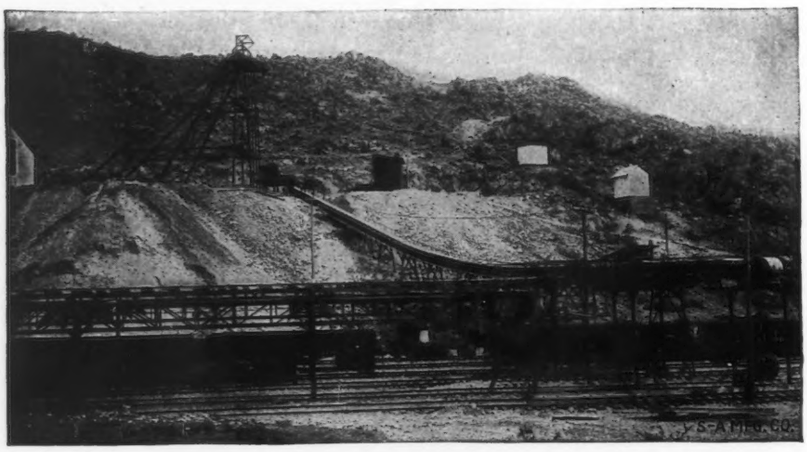
The Denver Fire Clay Company

Manufacturers of Assayers' and Chemists' Supplies

Denver, Colorado U. S. A. Salt Lake City, Utah

Insist Upon "S-A" Belt Conveyors
for use with
Your Crusher Equipment

It will pay you to demand that "S-A" Conveyors be furnished. They insure your plant against conveyor troubles; they meet your demand for reliable service; they operate successfully under the most adverse conditions. Their economy of operation (all things considered) fully warrants your insistence upon this grade of equipment.



Our newly developed Unit Carrier used under "S-A" belt conveyors are strongest and lightest on the market. Made of finest pressed steel—dust-proof ball bearings make it very light running.

CONVEYING ENGINEERS — TRADE S-A MFG.CO. MARK

If you have a difficult conveying proposition put it up to our board of engineers. Maintained to co-operate with you, they've solved many a tough problem—have cut down the maintenance costs of many a mine.

Ask Us To Send You The "Labor Saver"—Free

It's a monthly booklet of pertinent facts to the mining man. Tells you of the latest labor and money saving developments—of what your competitors are doing in the way of improving their facilities. It's free. Give us your name and position. We'll put you on the mailing list Write us today.

Stephens-Adamson Mfg. Co., Aurora, Ill.

BRANCH OFFICES:

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First National Bank Bldg., CHICAGO
H. W. Oliver Building, PITTSBURGH
303 Abington Bldg., PORTLAND, ORE.
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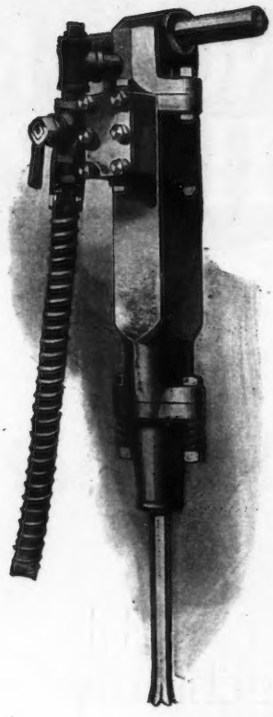


The No. 50 Cleveland Hand Sinker

Making New Records Every Day

New records for speed of drilling, efficiency—that is low air consumption in connection with its capacity—and low repair costs.

The Chuck, Cylinder, Valve Chest, and Cylinder Head—all the principal parts in sight are made from high grade steel, **drop forged**, so that they are practically unbreakable. The front cylinder bolts are protected against breakage by high grade steel springs.

Here's a Case in Point:

Two men with two No. 50 Cleveland Hand Sinkers are doing more work per shift in a Michigan hard ore shaft, than four men were formerly doing with two standard piston drills—a saving of 50% in labor, 50% in air consumption and 90% in repair charges. If you could effect a similar saving wouldn't it be worth your while? You can do exactly the same—give us shipping instructions and prove it for yourselves.

Try One in Your Shaft—Write for Bulletin No. 30

The Cleveland Rock Drill Co.

6410 Hawthorne Avenue, Cleveland, Ohio

New York, 30 Church Street. **Chicago, 704 Fisher Building**

San Francisco, Cal.—D. D. Demarest Co.
Denver, Colo.—Vaughan Mchy. Co.
Salt Lake City, Utah—Salt Lake Hardware Co.
Victor, Colo.—The Cleveland Rock Drill Co., P. O. Box No. 155
Mexico City, Mexico—United Sales Co.
Wallace, Idaho—Coeur d'Alene Hardware Co.
Ishpeming, Mich.—P. O. Box No. 234.
The names of foreign agents in any locality supplied on request.

Canadian trade supplied by The Canadian Cleveland Drill Co., Ltd., 24 Adelaide Street, West, Toronto, Ont.

ARE YOU FIGURING ON BUILDING A MILL?

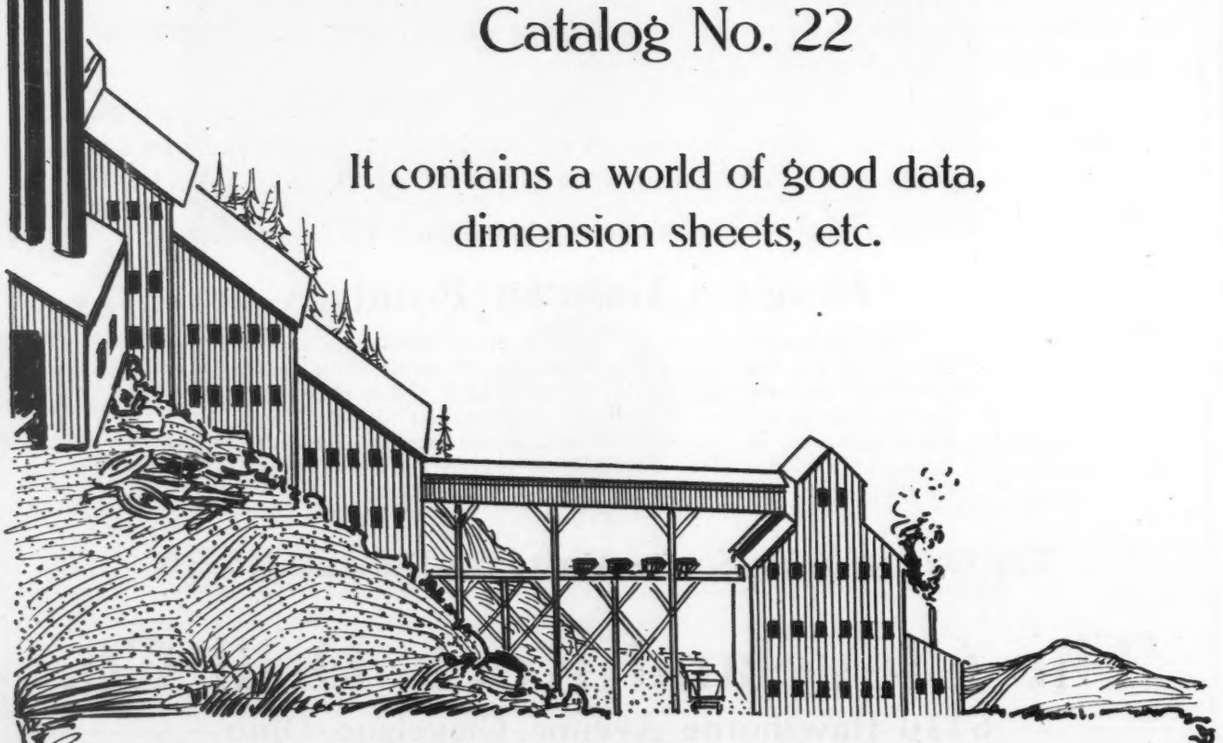
Or

Enlarging Your Old One?

If so,

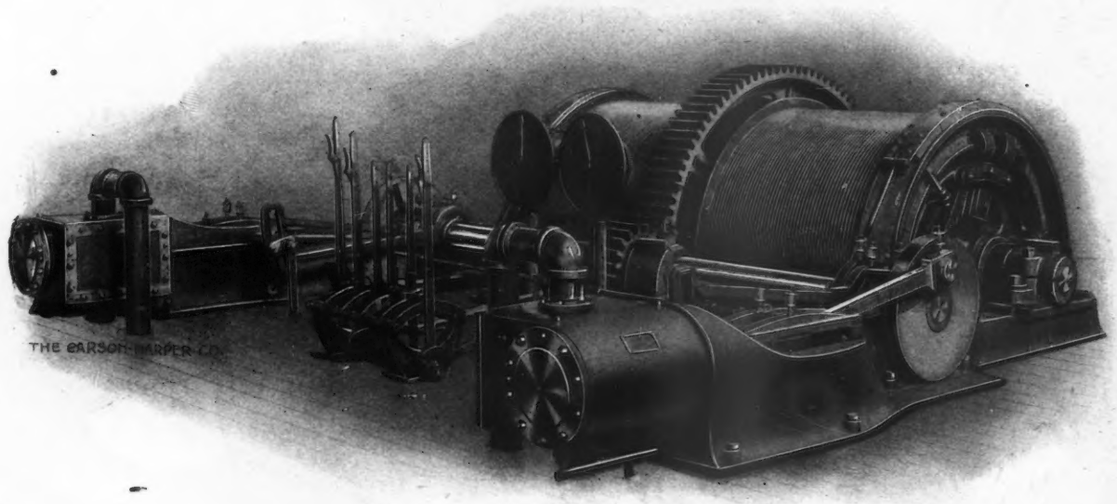
You Need our Milling Machinery
Catalog No. 22

It contains a world of good data,
dimension sheets, etc.



Hendrie & Bolthoff
MFG. and SUPPLY CO. DENVER, COLORADO

If It's A Wellman-Seaver-Morgan It's Exactly The W-S-M Hoist You Need



W-S-M Geared Hoist for Steam or Compressed Air.

We Couldn't Afford To Sell An "About-What-You-Need" Hoist

For we have learned some valuable lessons in the more than 40 years in which we have been building hoists. And one of those lessons is this:—

If a hoist is going to be a thoroughly good hoist, going to show the minimum per-ton hoisting cost, it cannot be the hoist that is *about* what is needed—It must be *exactly* the hoist needed for that particular work. That is why we maintain our large and expert corps of engineers—consulting specialists on hoisting.

The success of the W-S-M Hoist depends upon satisfaction given after our hoists are put to work. And we have learned that thoroughly satisfactory service is possible only with the hoist that is "*exactly* the hoist you need."

Why not advise our hoisting specialists of your needs and let them tell you what you can expect from the hoist that exactly meets them?

It will cost you nothing. Neither will it place you under any obligation.

You've Never Seen Finer Geared Hoists

than the Wellman-Seaver-Morgan shown above. They are for use in mines of moderate depths. Engines have double ported balanced slide valves and are connected to drums by machine cut steel gears. They're built in 5 sizes and are in use in all the principal mining camps of the country.

Our Booklet:—"Mining Machinery—Steam and Electric"—contains some interesting information. We will gladly send you a copy.

The Wellman-Seaver-Morgan Company

GENERAL OFFICES: CLEVELAND, OHIO, U. S. A.

NEW YORK, Hudson Terminal

BRANCH OFFICES:
MEXICO, D. F., Apartado 1220—14 a de Guerrero 3326.

DENVER, 611 Ideal Building

"Standard" Crusher Parts

THEY are not built to meet a lower-than-any-price, but are made from a quality standpoint. The steel used is of such quality that it insures your receiving solid, weldless parts that will give excellent service and the best of satisfaction.

If you value low upkeep cost, low operating cost, low crushing cost, rather than cheap first cost "Standard" Crusher Parts will give you the desired results.

"Standard" Parts are made for all standard crushing machines.

Write for copy of our Catalogue

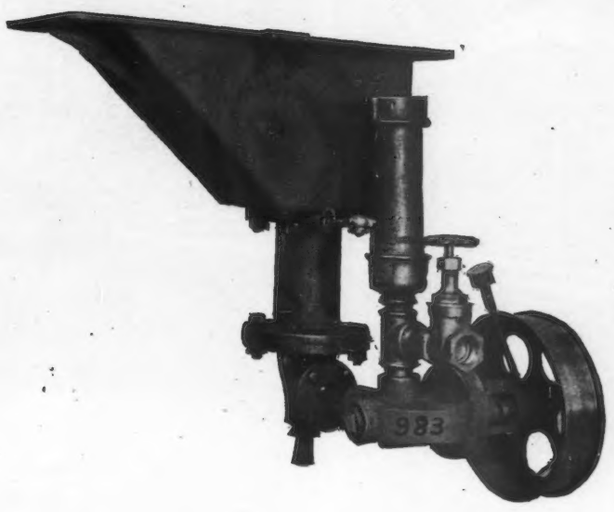
Standard Steel Works Company

Morris Building, Philadelphia, Pa.

New York, N. Y. Pittsburgh, Pa. Chicago, Ill. St. Louis, Mo. San Francisco, Cal.
Richmond, Va. Portland, Ore. Denver, Colo. City of Mexico, Cal.

Steel Tires, Steel Tired Wheels, Solid Forged and Rolled Steel Wheels, Rolled Steel Gear Blanks, Steel and Iron Axles, Steel Springs, Steel and Iron Forgings, Steel and Iron Castings, Rolled Steel Rings, Steel Crusher Rolls and Shells, Steel Pipe Flanges.

RICHARDS PULSATOR CLASSIFIER
LAUNDER TYPE



THE LAUNDER type Richards Pulsator Classifier is designed to meet the demand for an inexpensive device that will furnish a classified product for one table, or for 2, 3, 5, 10 or any number whatever. A classifier that may be attached to your already existing launder—at just the right location nearest the table or tables you desire to feed—to draw just the right amount from the pulp in the launder—classify it to make a perfect product for your table—and deliver it to the table in just the right quantity.

Under proper conditions one of these classifiers attached to a launder carrying pulp containing heavy coarse free mineral may be adjusted to discharge a clean shipping concentrate.

THE DENVER ENGINEERING WORKS CO.
Denver, Colo., U. S. A.

SALES AGENTS:	SAN FRANCISCO: LOS ANGELES:	Harron, Rickard & McCone for California, Western Nevada, Western Arizona.
	MEXICO CITY:	Victor M. Braschi for Republic of Mexico.
	SPOKANE:	Hallidie Company for Coeur d'Alene District and Eastern Washington.
	SYDNEY:	N. Guthridge, Limited, for Australia.
	LONDON:	Fraser & Chalmers, Limited, for Europe, Asia (except Japan) and Africa.
	TOKYO:	Takata & Company for Japan.
	ANTOFAGASTA:	Orchard Hermanos for Chile, Bolivia and Peru.

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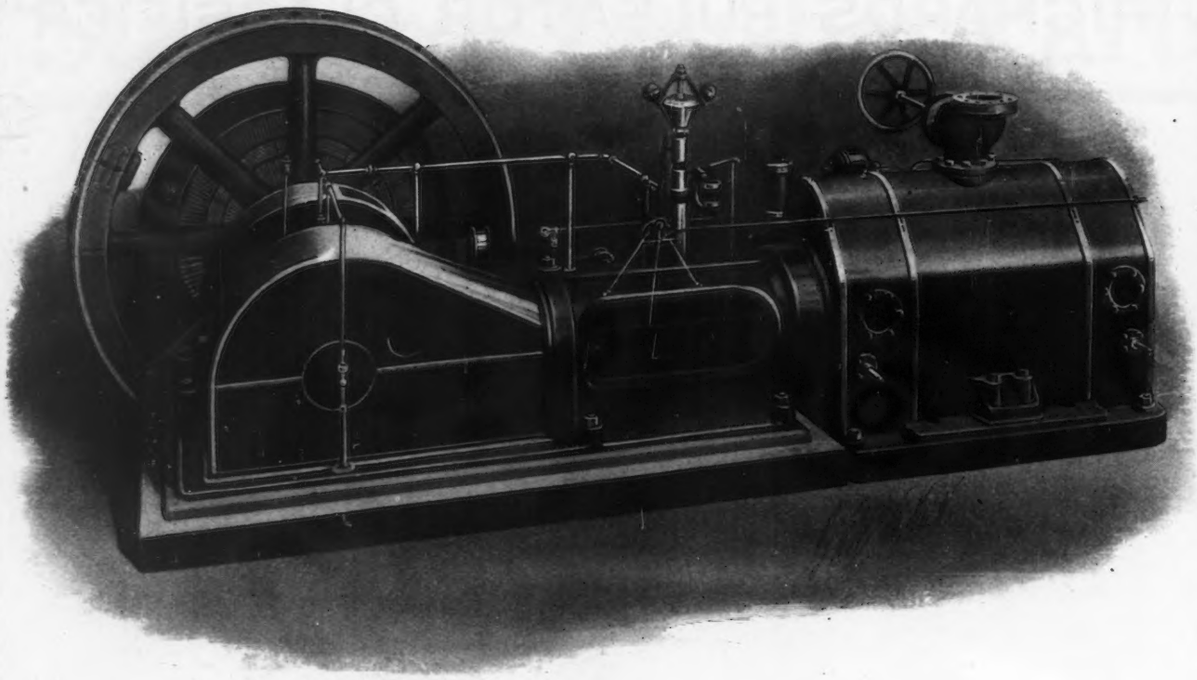


Nordberg Uniflow Engine

Suitable for: Rolling Mill Service
Direct Connected Generator Service
General Power Purposes

The Engine to use where the load fluctuates or where the load factor is low.

We call the attention of Engineers to the fact that we are the only concern, in this country, who have built a Uniflow Engine.

We have not only built this Engine but ran it at our Works for several months and made over one hundred (100) complete tests on same, so that we now have direct and specific knowledge of this Engine. Furthermore, all problems as to design and operation have been solved *at our expense.*

Any information given by other concerns with respect to Uniflow Engines is, therefore, a matter largely of surmise and hope.

NORDBERG MACHINERY

Nordberg Manufacturing Company

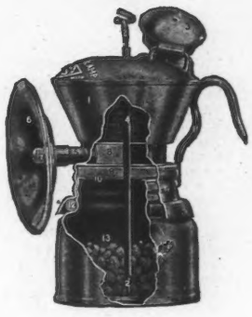
Milwaukee, Wisconsin

BUILDERS OF CORLISS ENGINE, POPPET VALVE ENGINES, AIR COMPRESSORS. BLOWING ENGINES, HOISTING ENGINES, PUMPING ENGINES, STEAM STAMPS.

NEW YORK, 42 Broadway. **CHICAGO,** Schiller Bldg. **GLOBE, Ariz.** **BUTTE,** Electric Bldg.

The Lamp You Should Use
IS THE
Baldwin Carbide Lamp

Six years of progressive experience during which time the reliability of the Baldwin principle has been thoroughly demonstrated, and the value of acetylene as a mine light proven, is an excellent reason why you should give the question of acetylene lighting immediate consideration.



TRY THIS ON A BALDWIN

Remove the carbide container, fill the water font and allow the water to drip. It will empty itself in about twenty minutes, but when you have the lamp lighted one charge of water will last from two to three hours depending on the burner you are using the standard, medium or large size burner.) That goes to prove that the gas pressure controls the flow of water.

The reason the Baldwin Lamp is so universally used is because of its simplicity, and its being designed to withstand rough usage. The average life of a lamp being at least 200 working days according to the figures furnished by mining company officials which means a low cost of maintenance.

Don't Wait Any Longer—

but send to-day for catalog, then select the type you think best adapted for your mine and send for sample. You can prove every one of our claims.

JOHN SIMMONS COMPANY
104 Centre Street New York

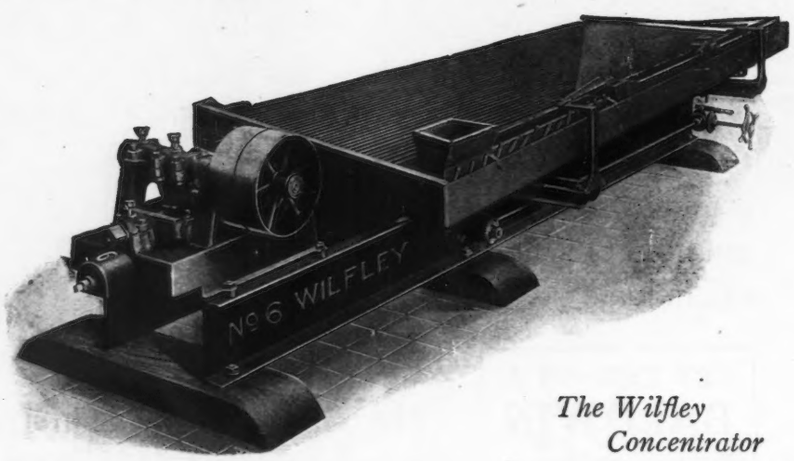
BRANCHES { **266 Market St., San Francisco, California**
56 St. Nicholas St., Montreal, Canada

JOHN SIMMONS COMPANY, 104 CENTRE STREET, NEW YORK
Baldwin Lamps are not used in our mines. I will thoroughly test a lamp if sent FREE OF CHARGE.
I am superintendent of.....
Name of mine and company.....
Signed.....
Address.....
We usually buy our supply of lamps, etc. from.....
147

"WILFLEY"

A Synonym For Efficient Concentration

These tables are manufactured solely and exclusively by us under U. S. Letters Patent No. 590675 to A. R. Wilfley, dated September 28th, 1897, which we own and which covers the feature of advancing terminals of riffles on a diagonal line as practiced in the manufacture of the Wilfley Tables by us, and notice is hereby given that the Wilfley Patent anticipates all forms of construction which embody the primary function of that feature of the Wilfley Patent; and such construction by others will be considered by us an infrigement of the claims of the Wilfley Patent and will be dealt with accordingly.



The Wilfley Concentrator

For the "Wilfley" is to be found in successful operation all over the face of the earth. ¶ Then, too, the "Wilfley" is the table in which diagonal ending riffles were originally used; the riffle design is a basic principle covered by letters patent in the United States and foreign countries, owned, controlled, and manufactured only by The Mine & Smelter Supply Company. There is therefore no imitation about the "Wilfley"—in it you get the best in its original form. ¶ **Remember**—in the Wilfley you get the best and in no other. ¶ Let us go into the matter in detail with you.

No matter what you need in Mining and Milling Machinery, Mining, Assay and Chemical Supplies, you will find it at any one of the Mine and Smelter Supply Co. Stores.

The MINE AND SMELTER SUPPLY COMPANY

·DENVER· SALT LAKE CITY· EL PASO ·MEXICO CITY·

New York Office, 42 Broadway

SOLE OWNERS AND MANUFACTURERS OF THE WILFLEY CONCENTRATOR

The Wedge Mechanical Furnace

Patented

Cast-Iron Shafts Eliminated By Modern Patented Designs

Years ago when we first began building furnaces for private use, we used cast-iron shafts, with the arms bolted to the shaft. We tried various designs, and our experience was probably similar to what yours has been if you have used **large** furnaces having cast-iron shafts.

It is necessary to cool a cast-iron shaft, which was done in our early designs, with air, and later with water. This type, having the arms bolted to shaft, necessitates shutting down the furnace to replace an arm. These interruptions are expensive. Further, as everyone knows, cast-iron about a furnace, exposed to the heat and the gases, is sooner or later eaten out. Further, the replacing of a cast-iron shaft or sections of same, is an undesirable expenditure of money and labor.

To do away with all these difficulties, the same type of construction was adopted in the shaft as is used in the walls of the furnace. The shaft is protected by brick, the same as the outer shell is protected by brick walls.

Further, an arm can be changed in a hot furnace in less than an hour's time. This all means economy in operation.

Write us, stating analysis of ore, concentrates, mixture or material you desire to roast, characteristics and physical condition of same, number of tons to be treated per twenty-four hours, and results you desire in the calcine.

Wedge Mechanical Furnace Company

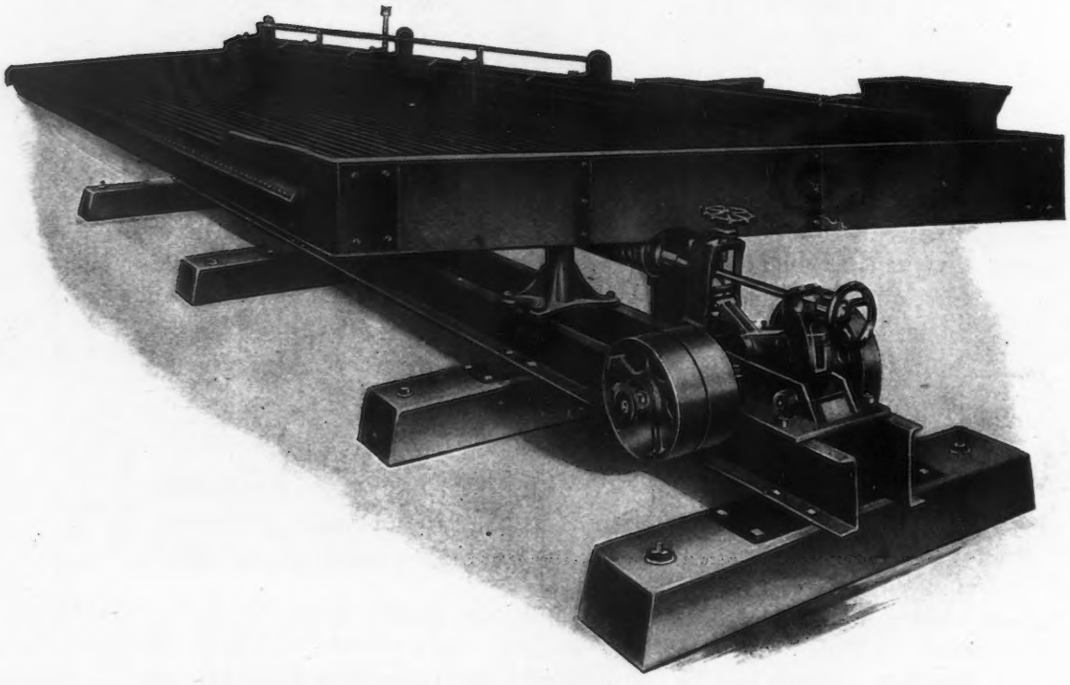
Philadelphia, Pa.

"My Hat Is In The Ring"

So is the

LODWIC

"No Ripples"—"No Currents"



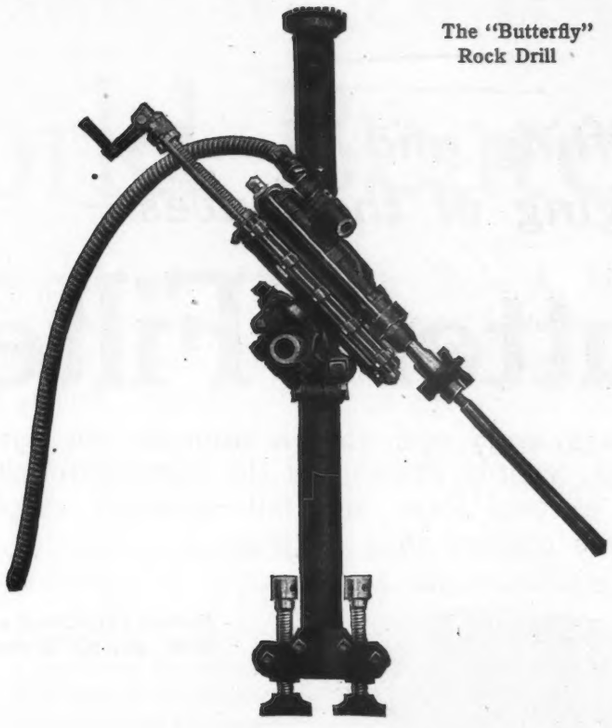
Not "*Just* as good," but "***better.***"

Lodwic Concentrators are manufactured under United States Letters Patent, Nos 533,362 and 641,977, issued to Jacob Lampert, as well as under a license from Arthur R. Wilfley and The Mine and Smelter Supply Company of Denver, Colorado.

Before buying elsewhere, write us for further information, prices and terms.

The Lodwic Concentrator Company

313 West Third Street **Los Angeles, Cal., U. S. A.**



The "Butterfly"
Rock Drill

Standard Rock Drills

The footage drilled per day, per month or per year is the measure of rock drill capacity.

The total cost per foot of hole drilled, month after month, is the measure of rock drill economy.

The drill which shows the largest footage at the least total cost is the drill which is the best money-maker for its owner.

The experience of the largest mines, quarries, and contracts, the world over, has proved that Ingersoll-Rand Rock Drills are the standards of capacity and efficiency, which stand for maximum profits.

NEW YORK **INGERSOLL-RAND CO.** LONDON

Offices in All Principal Cities of the World.

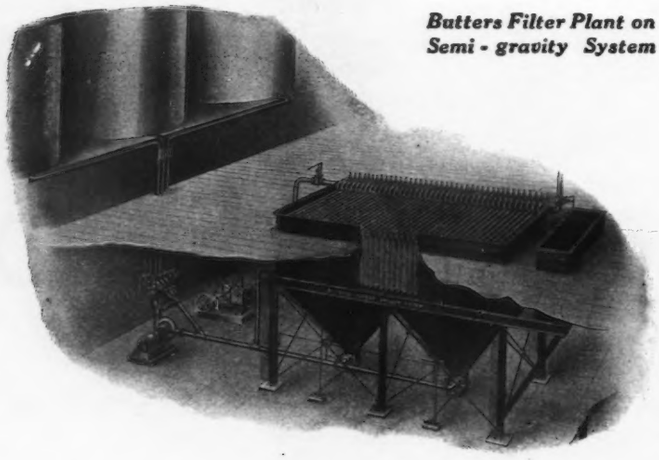
Compressors **Rock Drills** **Core Drills** **Electric-Air Drills**

RD-1

No lifting and changing of the leaves—

Butters Filters

In a Butters, every operation is done in one vat—there's no tedious, wabbly shifting of the leaves—no chance for the cake to peel loose and fall—absolute displacement of values is positive in a Butters.



Butters Filter Plant on Semi - gravity System

Think of the saving in money that a Butters means to you—for only **one man** is required to produce 100% effectiveness. **Butters Filters** have made possible the development of some mines that were formerly worthless. Ore assaying as low as 55 cents a ton is made to pay a profit with a Butters.

The Butters Patent Vacuum Filter Co., Inc.

30 Church Street, New York, U. S. A.
54 Broad Street, London. E. C.

908 Metropolis Bank Building, San Francisco, U. S. A.
Gante No. 1, Apartado 1578, Mexico City, Mexico

AGENTS

Fraser & Chalmers., Ltd., London and Branch Offices. Sandycroft Foundry Co., Ltd., London and Chester, England.
Fried. Krupp A. G. Grusonwerk, Magdeburg, Germany.

World Beaters!!!

The following list of "Movable" or Type A, Moore Filter Process Plants, treating in the aggregate several thousands of tons of Gold and Silver slimed ores *daily*, in the Pachuca District, Mexico, have as the result of their high efficiency, put a q-u-i-e-t-u-s on the making of further installations of the "Stationary" or Type B, in that region.

Negociacion Minera de San Rafael y Anexas.
Compania Beneficiadora de Metales "La Union, S. A."
Compania Minera de Natividad y Anexas, S. A.
Compania Purisima Grande, Guadalupe y Anexas.
Compania de Minas La Blanca y Anexas, S. A.
Negociacion Minera de Santa Gertrudis y Guadalupe, S. A.
Compania Beneficiadora de Metales, Haciendas de San Francisco Pachuca, S. A.
Senor Gabriel Mancera.
Rincon y Anexas, S. A.
Compania Beneficiadora de Pozos, S. A.
Compania Minera El Barreno y Anexas.

Our Engineering Staff, which is at your service, is of a very high order—as it should be, when the question recovering the last "trace" of Gold and Silver values once reduced or put into solution, is involved.

Coupling the Clancy Electrochemical Process with the Moore, the combination for high extraction, minimized loss of Cyanide, complete "displacement" (recovery), is perfect.

We are guaranteeing one of the companies in Mexico having at present an installation of the "Stationary" Filter (not of our designing, however) an economy of $100,000 per annum, by adopting our Moore-Clancy Process, which will include changing over to the "Movable" Type of working the Process; so you see, we are still quite in the "running."

The Moore Filter Company

New York, U. S. A.

NOTICE:—For branch offices and agencies see issue of this journal of November 4th, 1911

1860

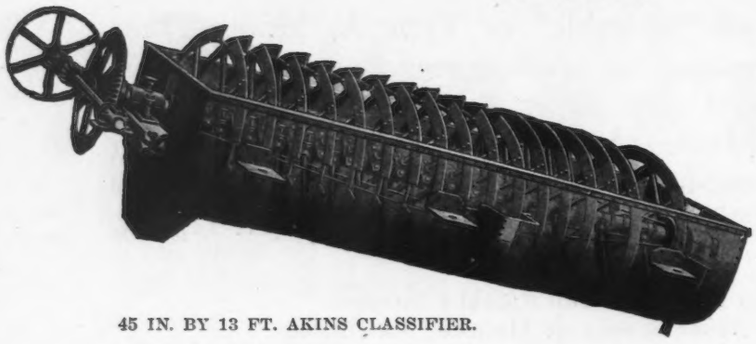
COLORADO IRON WORKS COMPANY

ORE SMELTING EQUIPMENTS — ORE MILLING MACHINERY

1912

THE AKINS CLASSIFIER

PATENTED



45 IN. BY 13 FT. AKINS CLASSIFIER.

You Don't Have To

DIG IT OUT

Before Starting

After A Shut-Down

As is usual, the simplest machine has proved the best. The Akins classifier with its single rotating part accomplishes all or more than any more complicated machine does or can do. It requires next to no attention and the first cost is all it costs. Write for particulars.

Colorado Iron Works Company - - Denver, Colo., U. S. A.

Steel Castings

For All Classes of

Mining and Dredging Machinery

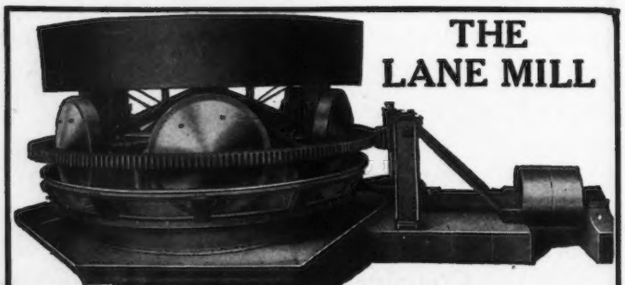
Tough for Wear. **Reliance Steel** Hard for Crushing.

Best Results. Reasonable Price.

Reliance Steel Casting Co.

28th STREET : : PITTSBURG, PA.

THE LANE MILL



in competitive tests ALWAYS shows from 10% to 30% better saving than stamps. The initial and operating costs are less.

Full details on request.

Lane Mill & Machinery Company,

Successors to Lane Slow Speed Chilian Mill Company,

236-247 Douglas Bldg., Los Angeles, California

"STAG" BRAND

MANGANESE STEEL CASTINGS

EDGAR ALLEN AMERICAN MANGANESE STEEL CO.

Chicago, Ill. New Castle, Del.

TISCO Manganese Steel

Castings for Severe Service

TAYLOR IRON & STEEL CO., HIGH BRIDGE NEW JERSEY

BACON'S ORE & ROCK CRUSHING ROLLS

SEND FOR -CATALOGUE-

EARLE C. BACON

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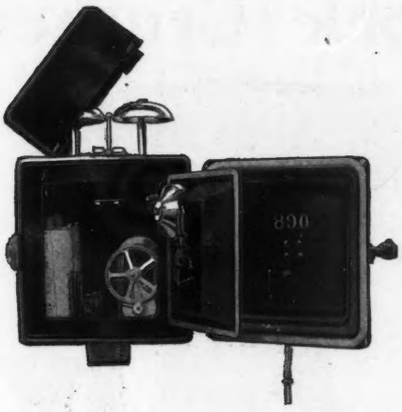


Your Mine Is Worthy Of The *Best*— MINE-A-PHONE

You need a system of communication that is the best —the most dependable—that money can buy. You need the assurance that nothing can go wrong—that, at no time, will the system fail you.

Such dependability is found in the **MINE-A-PHONE** the original and most perfect system of mine telephone. The difference between a **MINE-A-PHONE** and any other instrument lies in this fact—ordinary mine telephones are *adapted* to the conditions; a **MINE-A-PHONE** is designed and built to *meet* them—see the distinction. There are twenty-two exclusive **MINE-A-PHONE** features—every last nut or bolt is made to do its utmost toward producing effectiveness in the nth power.

With a **MINE-A-PHONE** system back of your mine organization, you're in instant and constant touch with conditions—breakdown, explosion, accident or fire; or perhaps a question of policy—whatever it is, you know about it instantly.

Get MINE-A-PHONE information. You need it. 'Twill not obligate you. Ask for Bulletin No. 2500. *Do it today.* NOW.

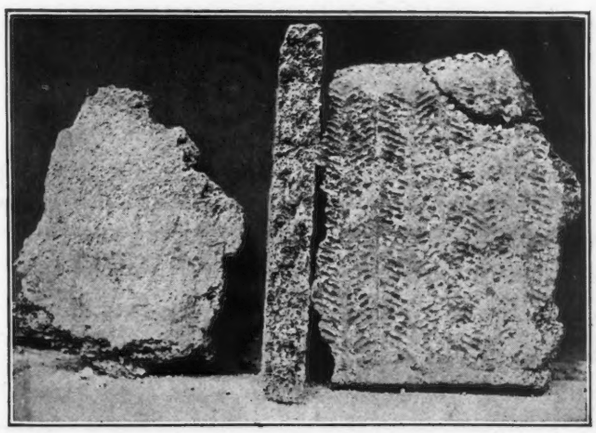
Stromberg-Carlson Telephone Mfg. Co.

Manufacturers of over 1,700,000 Telephones and 8,000 Telephone Exchanges

Rochester, New York, U. S. A.

CHICAGO, ILL. Los Angeles, Cal. | TORONTO, CAN. San Francisco, Cal. | KANSAS CITY, MO. Seattle, Wash.

The Dwight & Lloyd System of Roasting and Sintering has demonstrated by **4 years of practical experience** that a **satisfactory solution has been reached** of the vexatious problem of **cheaply and effectively treating Fine Ores and By-products** in the Metallurgy of Copper, Lead, Iron, etc.



Sample Cake of D & L Product, Thickness 4 Inches
(U. S. Pat. 1,020,345 for Product)

We are the Originators and Patentees of the **Down-draft Method of Sintering,** whether operated **Intermittently in Pans** or **Continuously,** and our **Chain** of **Patents** effectively controls the only practical and successful method of

Completely Sintering a Thin Layer of Fine Ore

Our Licensees have many large installations in successful daily operation, in the United States, Canada, Mexico, Australia, and Europe, and **remarkable indirect economies** are being effected in **Fuel, Labor. Furnace Speed, Metal Losses, etc.**

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It is the simplest and strongest suspension device for shafts of gyratory crushers, and has the largest bearing surface, insuring long life, requiring less power to operate, and reducing repairs, because the suspension sleeve revolves with a rolling motion and has no sliding or grinding action whatsoever.

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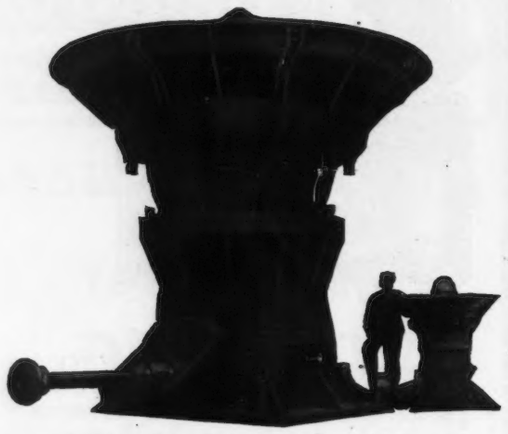

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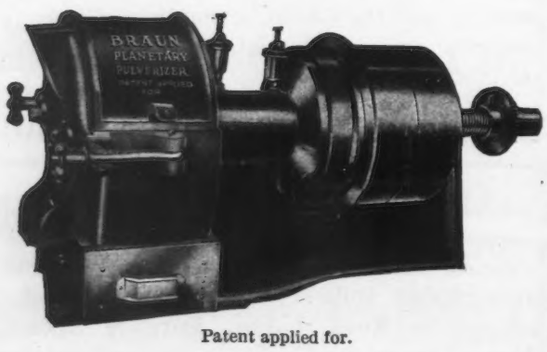

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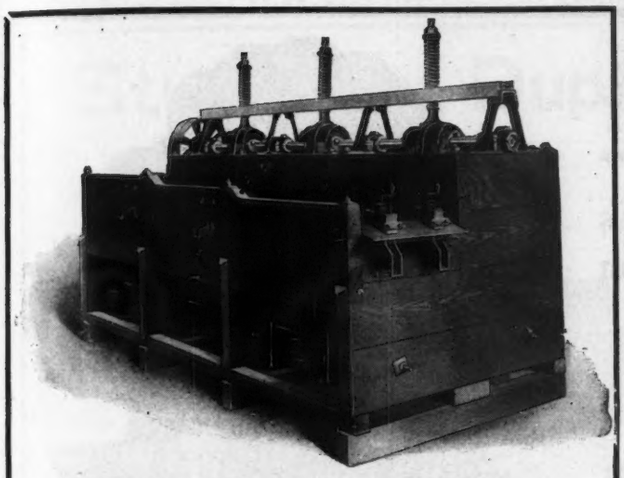

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Made to the United States Government and all recognized Specifications.
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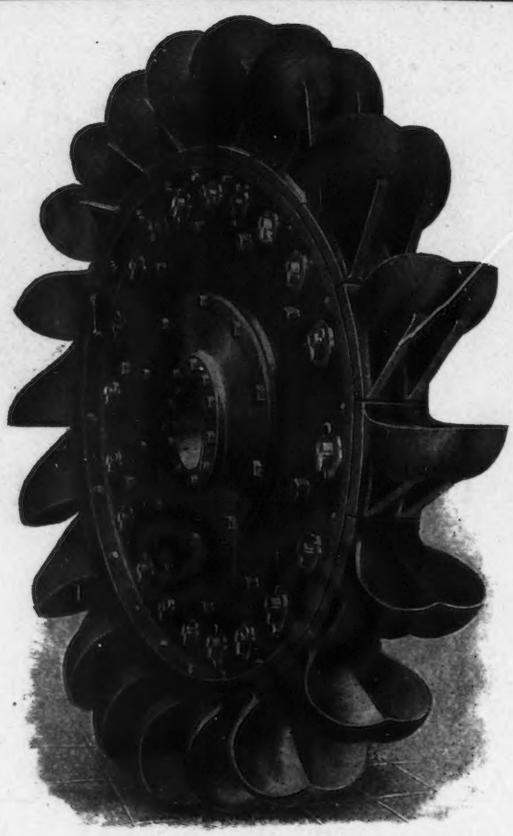

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By proper control of temperature of the roasting ore and practical utilization of heat, ores of lower percentage of sulphur than heretofore thought possible, are roasted without the use of fuel.

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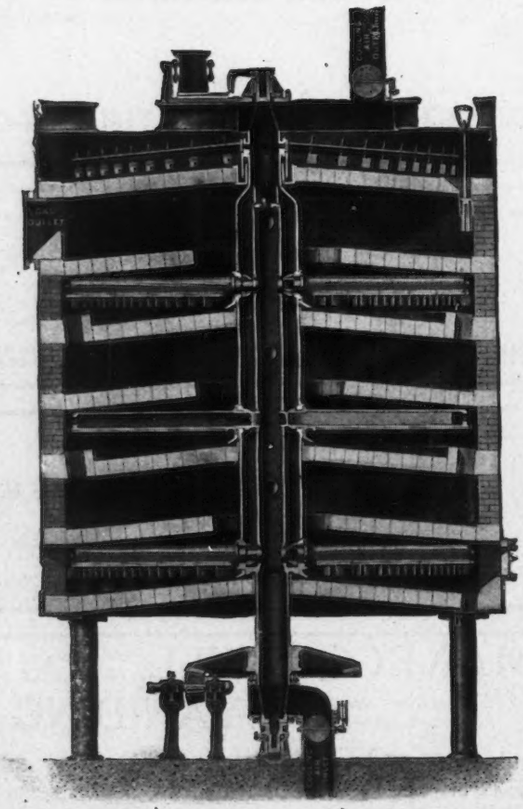
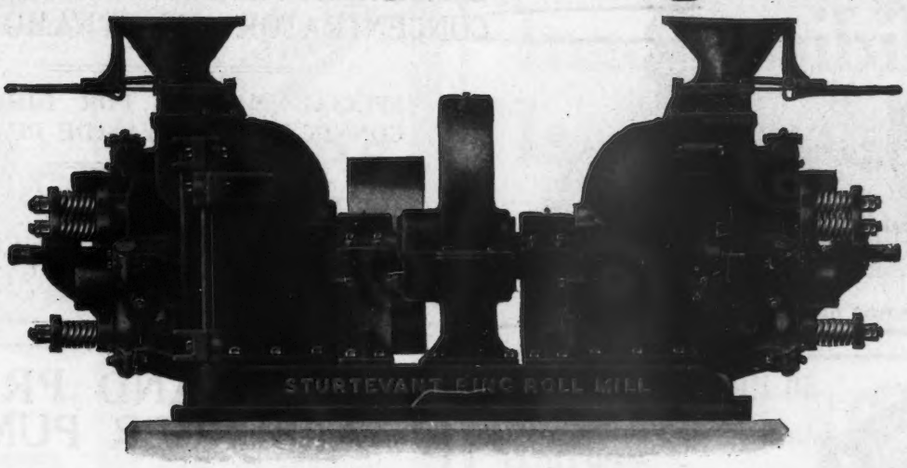


Sturtevant Duplex Ring-Roll Mill



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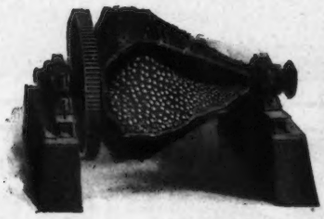

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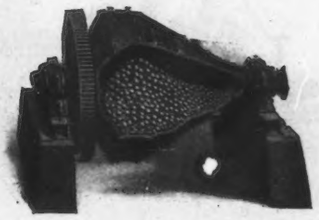

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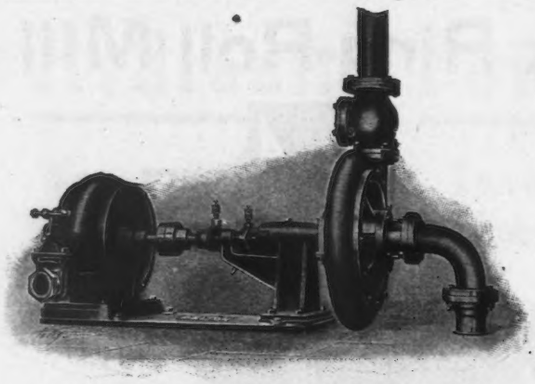

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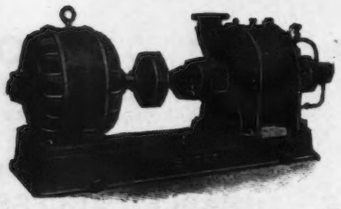

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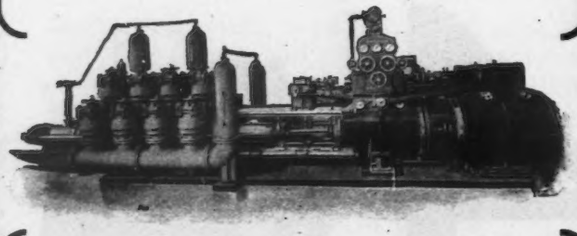
are in successful operation in every mining field on the continent. some of the earlier types, after continuous service for twenty-five years, are still running day and night, in some cases operating submerged for weeks at a time.



Jeanesville pumps are designed by men who have been successfully coping with great mine drainage problems all their lives. Take advantage of our fifty years' experience in building mine pumps.

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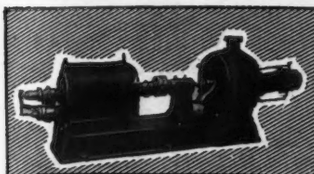
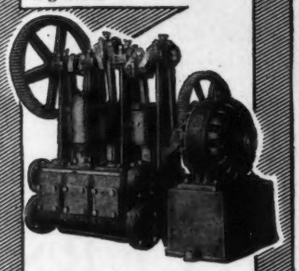
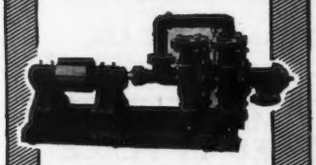


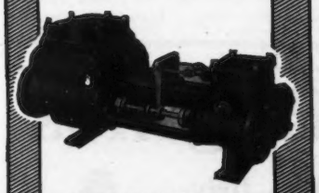
3-inch Two-Stage Turbine Pump, connected to steam turbine. For 400 feet working head.



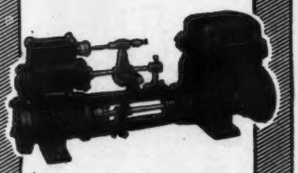
Single Acting Triplex Pump of 4-bearing type. For all-around service.



Compound Centrifugal Pump for handling moderate amounts of water up to 200 feet head.



Duplex Tank Pump for pressures up to 75 lbs. Valve openings and water passages extra large.



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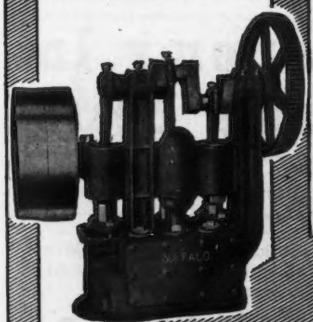

Single Acting Triplex Pump of 2-bearing type. For boiler feed and general water supply

"Buffalo"

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A few of our great many styles of pumps are shown here to suggest the completeness of the Buffalo line. Whether your primary consideration is *low first cost*, or *ultimate cost of operation*, it will be worth your while to investigate the "Buffalo" line.

We make a specialty of large turbine pumps and our installations in this line are a source of great satisfaction to us and the respective owners. The reliability and low repair cost of these pumps counts so heavily in mine drainage as to make them preferable to the most eminent high-efficiency types.

With our thorough knowledge of every style of pumping machinery, we are always glad to recommend from our line the pump best suited to your individual requirements.

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A problem that only equipment built especially for easy transportation can solve. Such equipment is this

CAMERON Shaft Sinking Pump

It is built sectionalized for muleback transportation and can be taken to isolated regions where transportation of a large, heavy pump would be an impossibility.

No part weighs over 300 pounds and the average is less than 150 pounds. Assembling or taking apart is a simple and rapid operation. And after this pump gets to the inaccessible mine it can be depended upon for continuous and faithful service.

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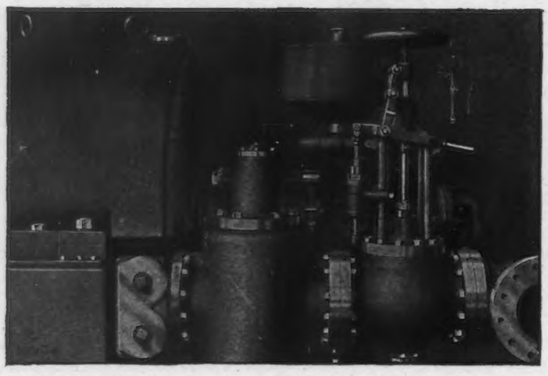

DE LAVAL Multi-stage Steam Turbines are unique in being protected in four ways:

The speed is controlled by a powerful governor operating a double-seated balanced poppet valve.

Runaway is prevented by an independent emergency governor operating an automatic trip valve, which is also used as the regular throttle valve of the turbine, thereby insuring that it shall be always in operating condition.

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Finally, the rings shrunk over the guide vanes of the diaphragms between the stages are made of steel sufficiently thick to resist the penetration of parts in case of rupture of wheels. These rings abut one another, thereby forming a complete and continuous armor.

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KROGH PUMP MFG. CO.
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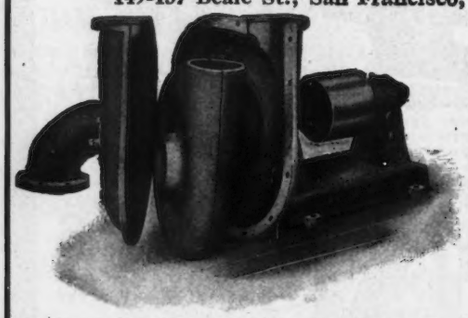

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Because:

It has ring oiling bearings and water air sealed gland.

It has removable liners, made of the hardest composition, which no tool will cut, and is ground to fit.

Impellor is made of manganese steel and can be readily renewed.

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HEAVY MACHINE PARTS WELDED IN PLACE

Process also permits of making small steel castings quickly. Apparatus simple and inexpensive.

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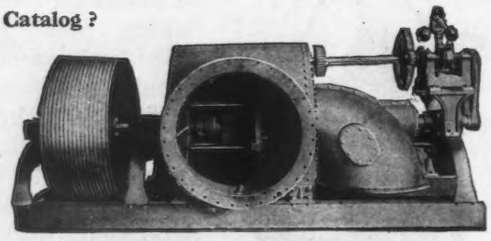

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For Contractors, Pile Driving, Quarry And Mine Duty.

Also tail rope haulage, inclines, slate machinery and suspension cableways.

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Satisfaction guaranteed

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The most durable pump for elevating
TAILINGS, SLIMES, BATTERY SANDS, ETC.
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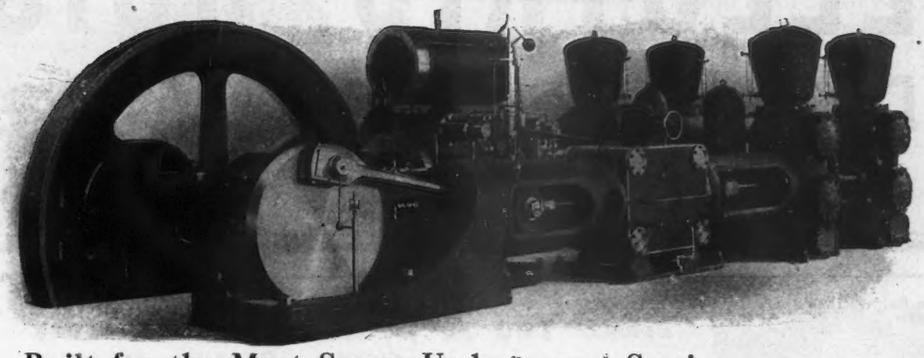

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Built for the Most Severe Underground Service

Heavy, simple in mechanical construction and extremely accessible in all parts.

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are reliable and economical in operation under all conditions and successful in meeting all emergencies. Corliss Direct-Acting and Power-Driven types for all capacities and heads.

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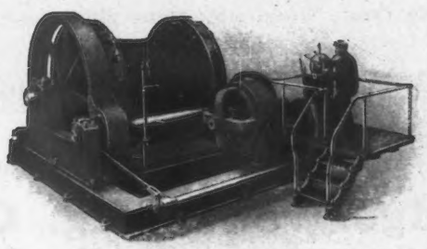

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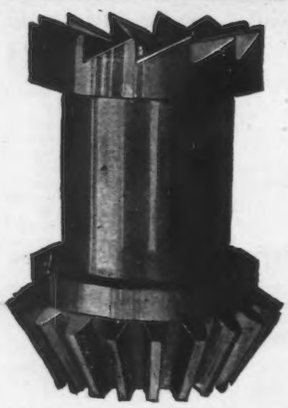

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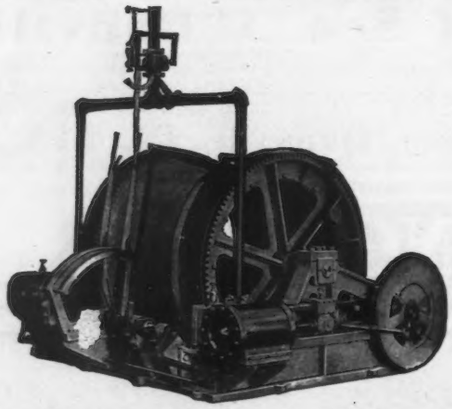
LIDGERWOOD MINE HOISTS



Double Gear, Reversible Mine Hoist with Post Brakes

Built With Low Side Stands

30 to 200 Horse Power

Cableways for all Hoisting and Conveying Purposes

Lidgerwood Mfg. Co.

96 Liberty Street New York

Chicago Pittsburgh Seattle London, England

Furnace Demand Clean High Grade Ore

Which can be obtained by using OUR LOG WASHERS for cleaning, and OUR JIGS for concentration.

We manufacture screens, elevators, conveyors, crushers and friction hoists.

Write for Catalogue.

McLanahan-Stone Machine Co.

Hollidaysburg, Pa., U. S. A.

Our Improved Automatic Trough Washer

removes impurities from

Coal, Culm, Ores, Sands, Clinker, Metallic Sweepings, etc.

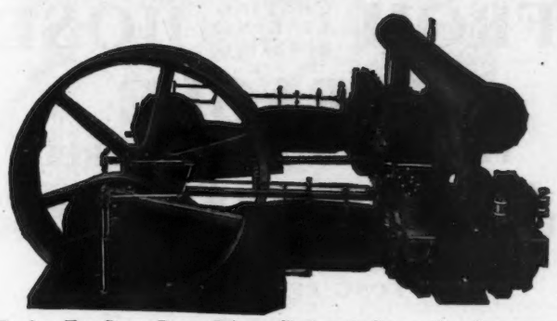
Excessive impurities and limited Water Supply no drawback. Large Output. Low Cost. Small Power required. **Simple, Durable, Efficient.** Easily and cheaply erected and operated anywhere.

Send for descriptive circular to

Scaife Foundry & Machine Co., Ltd.

Pittsburgh, Penn.

Cincinnati Air Compressors



Duplex Two-Stage Power-Driven Cincinnati Gear Air Compressor

The Power Bill Tells

The more air you use the more attention you should pay to compressing it economically. We specialize in the building of efficient air compressors.

Further you require heavy duty, durable construction and ready access to all parts, especially the running gear and the air valves.

All of these features you will find in the Cincinnati gear air compressor, several types of which are described in Bulletin L518-16.

THE LAIDLAW-DUNN-GORDON CO.
WORKS: CINCINNATI OHIO :: New York Office: 115 Broadway

Branch Offices in all Principal Cities
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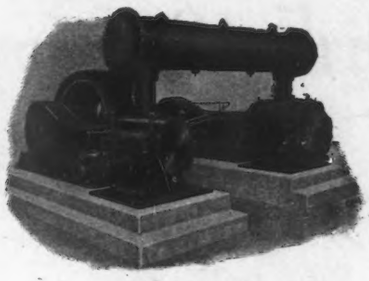
Didn't You Know We Made Air Compressors?

That's because you have heard so much more about our Pneumatic Tools and Rock Drills.



We build over 300 sizes and types of "Chicago Pneumatic" compressors and can refer you to 5000 users in every branch of industry. Steam, belt, gear, electric motor or gasoline engine drive, in capacities from 30 to 5000 cu. ft. free air per minute.

THEY ARE MADE BY THE

Chicago Pneumatic Tool Co.

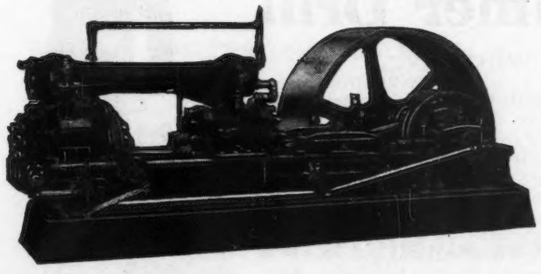
Makers of
Chicago Giant Rock Drills, Boyer Hammers, Little Giant Air Drills

CHICAGO 1010 Fisher Building — **NEW YORK** 50 Church Street

BRANCHES EVERYWHERE

Automatic Selective Proportional Unloaders

are found exclusively on the



Norwalk Compressor

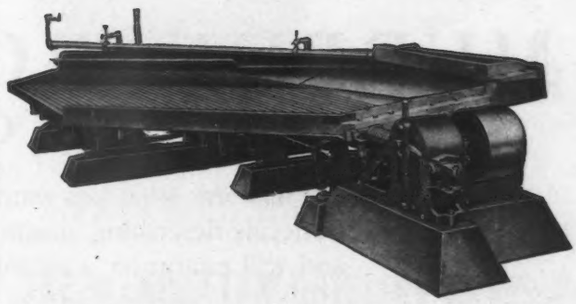
These improvements mark a new era in compressor construction. They gain the instant and favorable attention of all skilled engineers. ¶ For the usual hackneyed claims of *economy, durability* and *efficiency*, let our forty years' experience be an assurance of adequate and discerning attention to every feature.

The Norwalk Iron Works Co.

South Norwalk, Conn.

The James Diagonal Plane Table has been proven to have superior quality over the all-riffle table, the difference being 20% better extraction in a 60-day competitive test in favor of the diagonal plane table working on fine table feed. This table is manufactured in New Glasgow, Nova Scotia, for the Canadian Market, and Newark, N. J., for the United States and Mexican Markets.

A handsomely illustrated and descriptive Catalog will be sent you on request. Write for it.



James Ore Concentrator Company, 35 Runyon Street, Newark, N. J.

"Where ever there are Mines
There are WAUGHS"

THE Denver Rock Drill & Machinery Co.

OFFICES AND WAREROOMS

Denver, New York, El Paso, Salt Lake City, San Francisco, Johannesburg, So. Africa, Melbourne, Australia

WORKS

DENVER, COLORADO, U. S. A.

NO MORE TROUBLE
FROM CHAFING KINKING BURSTING HOSE

SPRAGUE

FLEXIBLE STEEL ARMORED

Air Drill Pneumatic **HOSE** Steam Water

ELIMINATES EXPENSIVE SHUTDOWNS
GIVES LONG EFFICIENT SERVICE

The flexible steel armor of Sprague Hose makes it almost indestructible. It is the ideal hose for use in mining and excavation work, machine shops, foundries and boiler rooms. Injury from external sources is impossible and the deteriorating effect of stretching is eliminated, greatly increasing the life of the inclosed rubber hose.

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Quarrymen who have not already used

The "Busy Bee" Hammer Drill

would do well to inquire of those who have.

For we have yet to find the quarryman who has used the "Busy Bee," who does not enthusiastically declare that for breaking up boulders and large pieces of stone, and for general cleaning up about the quarry, the "Busy Bee" is an indispensable tool. Over 200 feet of blast holes have frequently been drilled with one of these hammers in a single day.

You are *guaranteed real economy* by using "Busy Bee" Hammer Drills.

Full particulars are given in our "Busy Bee" Bulletin. Send for it.

McKiernan-Terry Drill Co., 115 Broadway, N. Y,

Canadian Representatives, Canada Foundry Co., Ltd., Toronto, Ont.

Rock Drills, Core Drills, Sheet Pile Hammers, Air Compressors. 3

MURPHY ROCK DRILLS

For All Kinds Of Rock Drilling

Let us know what you want to do and we will send you bulletins describing machines suitable for the work and will guarantee a saving over any other methods.

C. T. Carnahan Mfg. Co. Denver, Colo., U. S. A.

Seldom on the Pay Roll Always on the Job

Improved Wood Rock Drills

Day in, day out, always, ceaseless drilling -drilling - drilling. That's a Wood Rock Drill! Rarely needs repairing; requires little attention.

Never, like poor drills, continually at the cashier's window, spending more and still more money. The master mind that planned the first Wood Drill twenty-one years ago is still overseeing every detail of its manufacture now. If we weren't progressive we could well say "Here we rest our case"—but we're not the "resting" kind.

Ours is the one drill that's "certain." The one drill you can depend upon. The one drill that carries a guarantee which means something; "We guarantee Wood Drills against any defects during the entire life of the drill. We guarantee Wood Drills to do more work, cost less for repairs, and stay on the job longer than any other drill on earth."

Is that broad enough?

Write for our catalog, to nearest Agent.

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Wood Drill Works 30 DALE AVE., PATERSON, N. J.

Diamond Drills

We make the most complete line in the world. Hand Power, Horse Power, Gasolene, Steam, Air, Electricity, Hydraulic Feed, Screw Feed.

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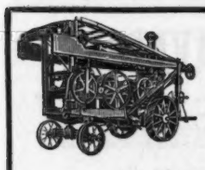
STANDARD DIAMOND DRILL CO.,
745 First National Bank Bldg. Chicago, U. S. A.



Keystone Cable Drills

are used for Copper and Zinc Prospecting, Placer Gold Testing, Heavy Blast Hole Drilling, Artesian Water, Oil and Gas Wells. Many sizes, all depths to 2500 ft. Traction and Non-Traction. Steam and Gasolene Engine Driven. Catalogs No. 1, No. 2, No. 2-B, No. 3, No. 4, No. 7.

Downie Double Stroke Deep Well Pumps

Steam or power driven, are designed for heavy service in deep Artesian Wells. Single stroke pumps for lighter deep well work. Catalog No. 6.

Keystone Test Drill Company,
Beaver Falls, Pa.

170 B'way, New York Carthage, Mo. Monad. Blk., Chicago

Cut Your Drilling Costs

THE DOBBINS CORE DRILL

Occupies much less space.

Is more convenient for operation.

Much less subject to breakage.

Has 25 to 50% greater efficiency than any core drill of equal rated capacity.

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No. 25 BROAD STREET
NEW YORK CITY, N. Y.

CASE GASOLINE BURNER

GOODALL BROS., ASSAYING.
Helena, Montana, May 24, 1912.

DENVER FIRE CLAY CO., Denver, Colorado.

Gentlemen: We have been using your Case Burner 2", and find it the most comfortable burner we have ever worked with. After a month's service the plugs are still tight and there is no leakage. It is so far ahead of the ——— burner that there is no comparison. The other burners we don't consider at all.

Sincerely yours, GOODALL BROS. (by Herbert Goodall.)

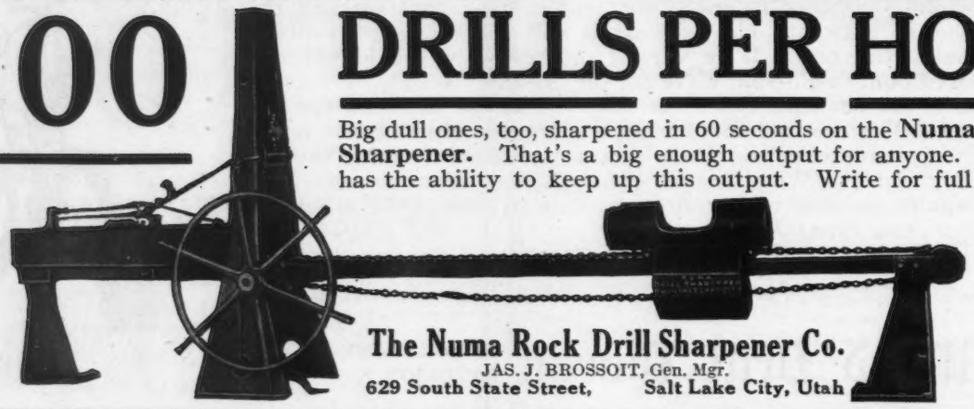
—MADE BY—

THE DENVER FIRE CLAY COMPANY

DENVER, COLORADA U. S. A. SALT LAKE CITY, UTAH

200 DRILLS PER HOUR

Big dull ones, too, sharpened in 60 seconds on the **Numa Rock Drill Sharpener.** That's a big enough output for anyone. The *Numa* has the ability to keep up this output. Write for full particulars.



The Numa Rock Drill Sharpener Co.
JAS. J. BROSSOIT, Gen. Mgr.
629 South State Street, Salt Lake City, Utah

Fort Wayne Electric Rock Drill

The drill that saves three-fourths of your present power cost and yet advance your work quicker, easier and better than ever. Did you see our ad. in June 1 issue? Well, don't wait for the next one—just write for Bulletin 1120.

Fort Wayne Electric Works
of General Electric Company
Rock Drill Dept. Madison, Wis.
Factories—Fort Wayne, Ind., Madison, Wis. Branch Offices—All Large Cities.

The Dorr Continuous Thickener

Far Superior to the Use of Settling Cones or Intermittent Settling

The many advantages of this new machine makes it imperative that you acquaint yourself with its details.

Also the Dorr Classifier.

Full details on request. Write.

The Dorr Cyanide Machinery Co.
First National Bank Bldg., Denver
Cable Address "Dorr." Codes: Bedford—McNeill and Western Union.
Grothe and Carter, Mexico City, General Agents for Mexico.

WELL DRILLING MACHINES

Over 70 sizes and styles, for drilling either deep or shallow wells in any kind of soil or rock. Mounted on wheels or on sills. With engines or horse powers. Strong, simple and durable. Any mechanic can operate them easily. Send for catalog.

WILLIAMS BROS., ITHACA, N. Y.

Going Prospecting?

Then you need our new booklet, "The Prospector's Outfit." Helps the old timer as well as the "Tenderfoot" to make the trip both pleasant and profitable.
Another folder describes

Way's Pocket Smelter

the ore testing outfit that will save time and money and enable you to test any ore "on the spot." Satisfaction absolutely guaranteed by a National Bank.

Your name and address

on the margin of this ad will bring you both booklets. Write NOW.

Way's Pocket Smelter Co.
Box 833, South Pasadena, Cal.

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Vacuum Slime Filters El Oro Tube Mill Lining

BLAISDELL COMPANY, Pacific Electric Bldg., Los Angeles, Cal.

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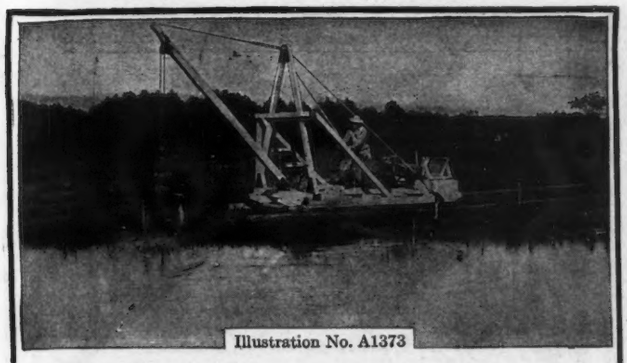
THE OLIVER FILTER

is efficient, reliable and economical.
For complete description get our bulletin.

Oliver Continuous Filter Co.
503 Market Street, San Francisco, Cal.



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Solve Your Digging Or Rehandling Problem Economically

No matter how large or how small the canal, drainage ditch, rehandling or excavating job may be,

Hayward Excavating Machinery

will do it at a lower operating cost than any other type of machine. And no machine has a lower first cost.

With a Hayward Machine, mounted on a flat boat, you can work in water. With a Hayward Machine, mounted on skids or mounted on a flat wheel wagon, you can work on land. The buckets are automatic in action, operated by one man only, saving time, labor and money.

Prices quoted on Buckets only, suitable for use with any type of operating machine, or prices quoted for Bucket and complete machines.

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50 Church Street **New York, U. S. A.**

"EMPIRE" GOLD DREDGES

Show the largest returns on the investment represented, because, while **saving all the values,** they require the **minimum operating and up-keep expense,** leaving **larger profits** than any other dredge can show. This is "Empire" service.

"EMPIRE" PROSPECTING DRILLS

Have never failed, under any conditions, to do more work in less time and at less cost, **with greater accuracy,** than any other prospecting drill.

New York Engineering Company

2 Rector St., New York

¶"Placer Gold, Suction and Dipper Dredges, Excavating Machinery, Centrifugal Pumps, Western Representatives of the Bucyrus Company for Dredging Machinery and General Steel Castings. Western Representatives of The Taylor Iron & Steel Company for Manganese Steel."

THE YUBA CONSTRUCTION CO., Marysville, California

OFFICES:

Works—Marysville, Cal. San Francisco—311 California St. Seattle, Wash.—Alaska Bldg.

Automatic Improved **DRYERS** For All Materials

Economical
Efficient
Great Capacity
American Process Co
68 William St
NEW YORK

ZINC

ANOTHER SUCCESS

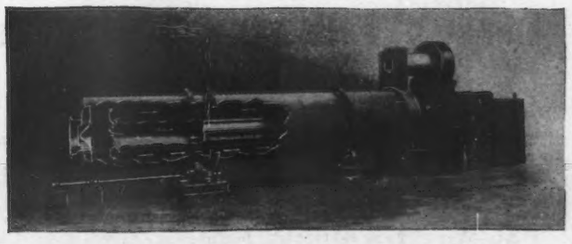
HUFF ELECTROSTATIC ZINC SEPARATOR PLANT recently installed on the Sunnyside Mine at Silverton, San Juan Co., Colorado, is much more than equalling our guarantee.

We test your ores in Denver, at our expense.

Write us.

American Zinc Ore Separating Company

18 Foster Building, Denver, Colorado



Your product becomes more valuable when all the moisture has been driven out.

Ruggles-Coles "Double Shell" Dryers

do this work at the lowest ultimate cost, as the testimony of the hundreds of concerns using them will teach you.

These dryers are standard for treating ores, concentrates, and scores of other minerals. Let us send you our newest booklet, "What We Dry," which describes the operations of this machine.

Ruggles-Coles Engineering Co.

McCormick Bldg. **Chicago** **50 Church St.** **New York**

37-76

Modern Weighing on Conveyors
The Electric Weigher

"Why did Number 2 Conveyor stop between 2 and 4 o'clock this morning"

The manager is taking the telephone down to ask his foreman this question.

The time recorder and the Electric Weigher keeps the manager in instant touch with the plant.

We guarantee accuracy and durability. Write for booklet.

Electric Weighing Company

182 Thirteenth Avenue **New York City**

Western Agents: The Mine & Smelter Supply Co., Denver, Colo.; Salt Lake City, Utah; El Paso, Texas; Mexico, D. F.

ROBINS SYSTEM
ROBINS BELT CONVEYOR

Conveying, Elevating and Hoisting Machinery. Robins Coal and Coke Crushers. We carry a complete stock of Chains and Sprockets. Write for monthly bulletins.

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Gilbert Wood Split Pulleys

Represent the product of 20 years' experience and detail improvement.

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Saginaw, Mich., U. S. A.

New York Branch, 88 Warren St: Chicago Branch, 105-109 N. Canal St. Sales Agencies in all the Principal Cities.

T. SHRIVER & CO.
FILTER PRESSES

826 Hamilton Street,

HARRISON, NEW JERSEY

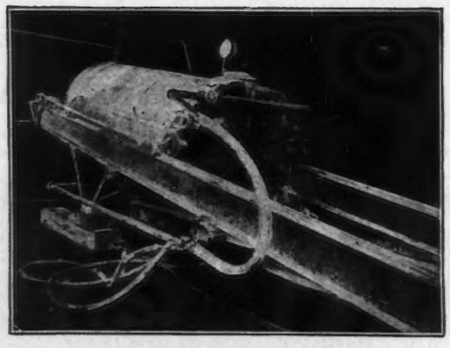
Let Us Tell You What The Kelly Filter Press Is Doing

We maintain a large testing plant where we will make a free test on your ore and thus present a guaranteed operation, that the Kelly installation will accomplish.

This is the only absolutely fair method of eliminating chances of failure and it's free without strings of any sort.

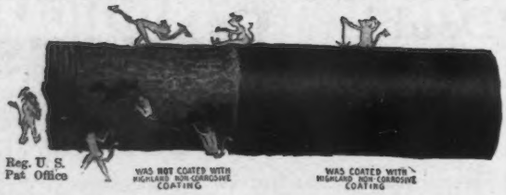
Tonnages of the Kelly Filter Presses are from 50 to 2000 tons per day. Many distinctive features are given in our Catalog.

Send for a Copy.



The Kelly Filter Press Company

209 Felt Building **Salt Lake City, Utah**



Beware The Sulphurettes

Unless your mine pipes are coated with Highland Non-Corrosive Coating the Sulphurettes will surely get busy and pick them to pieces.

Beware! Protect your pipes by using Highland Non-Corrosive Coating. Write the "Engineering Department" for free 6-month trial supply.

HIGHLAND
CHEMICAL PRODUCTS CO.
CONNELLSVILLE, PA.

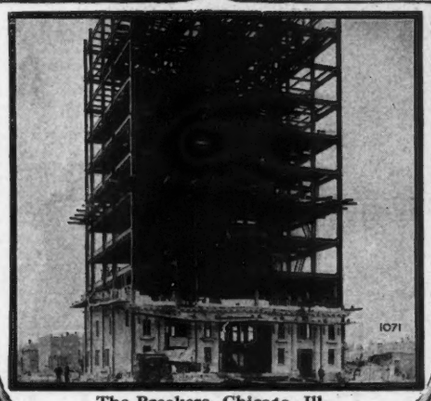
BRICK, TILE and TERRA COTTA MACHINERY

.... *Correspondence Solicited* ....

E. M. FREESE & CO., GALION, OHIO.

AMERICAN BRIDGE COMPANY OF NEW YORK
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**



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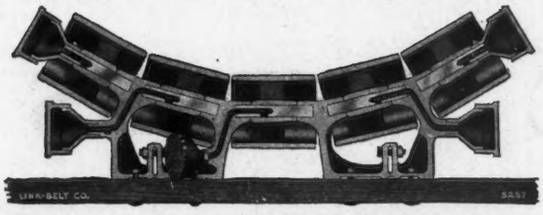

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FOR HANDLING
Coal—Ore—Stone—Gravel—Sand

We have manufactured and installed Belt Conveyors for purposes for which they were suitable for upwards of 20 years, and are furnishing the most efficient and durable equipment today

Let us solve your Elevating and Conveying problems. Our 38 years' experience in the design and construction of machinery for the efficient and economical handling of materials of every description, is at your service.

Address nearest office

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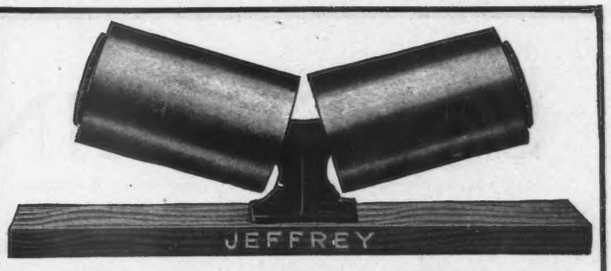
St. Louis, Central Nat'l Bank Bld.
Seattle, 118 King Street
Denver, Lindroth, Shubart Co.
San Francisco, Eby Machinery Co.
New Orleans, Wilmot Machinery



Jeffrey Standard Two-Pulley Belt Carrier
for "Century" Rubber Belt Conveyers.

This carrier can be adjusted easily and accurately without removing the bolts (all bolt holes in base being slotted on a radius from the center).

A distinctively advantageous feature possessed by no other carrier.

Exceedingly strong, light in weight and perfect self-oiling. The offset pulleys prevent the belt from cutting.

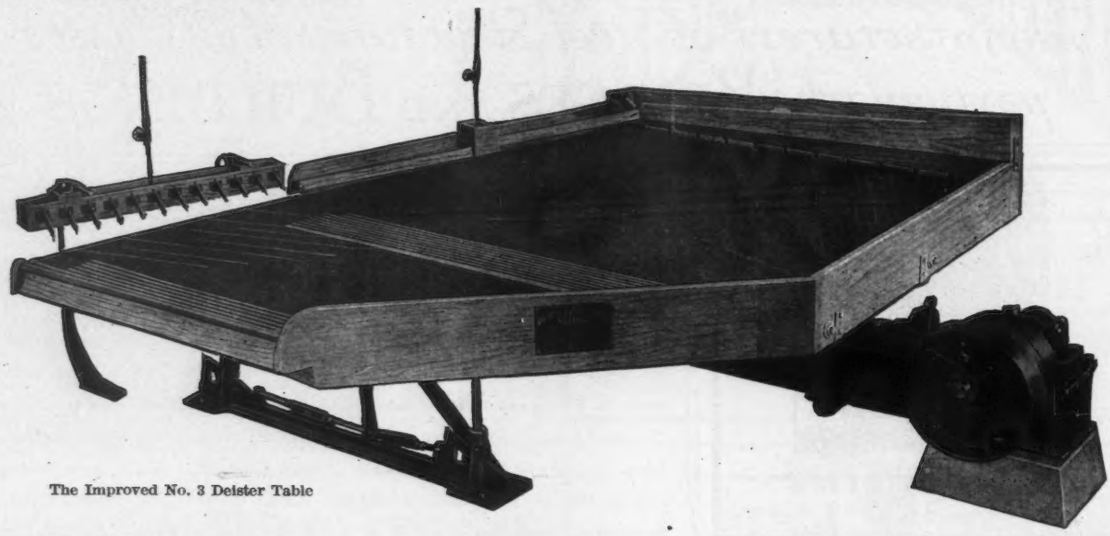
Every user of belt conveyers should study the advantages of this type of carrier. *Write for Catalog No. 67-D.*

Jeffrey Mfg. Co., Columbus, O.

New York, Boston, Montreal, Pittsburgh, Charleston, W. Va., Atlanta, Ga., Birmingham, Chicago, St. Louis, Denver, Seattle
6-29-12

Competitive Tests

Competitive tests at The Tomboy Gold Mines Mill demonstrated that our Improved No. 3 Slimer made a 25% greater saving than vanners besides making a separation of complex minerals from gangue at one operation. We are installing this type of our table in the above mill.



The Improved No. 3 Deister Table

The Deister Concentrator Company, Fort Wayne, Ind.

STEEL MINE TIMBERS

Used when driving new headings will result in a large decrease in the amount of excavating to be done, and when used to replace wooden sets in retimbering will give a considerable increase in the clearance on both sides and the top of the heading. They will also save their users many times their cost, not only in preventing loss of life, in providing protection against cave-ins and fires which may put the mine out of commission, but in every place where wood is liable to prove a means of destruction by falling under stress, decay or burning.

Catalog and Technical Pamphlet may be had on request.

CARNEGIE STEEL COMPANY

GENERAL OFFICES: PITTSBURGH, PA.

Mining Companies—United States

Name of Company and Situation		Shares Issued	Shares Par Val	Dividends Total to Date	Dividends Latest Date	Dividends Latest Amt
Acacia, g.	Colo.	1,438,989	$ 1	$ 129,618	Jan. '11	$0.01
Adams, s.l.c.	Colo.	80,000	10	778,000	Dec. '09	0.04
Ahmeek, c.	Mich.	50,000	25	450,000	Apr. '12	4.00
Alaska Mexican, g.	Alas.	180,000	5	2,976,381	May '12	0.40
Alaska Treadwell, g.	Alas.	200,000	25	12,360,000	May '12	0.75
Alaska United, g.	Alas.	180,200	5	982,090	May '12	0.50
Am. Zinc, Lead & Sm.	U. S.	84,000	25	648,540	Apr. '12	0.50
Anaconda, c.	Mont.	4,332,500	25	63,005,000	Apr. '12	0.50
Argonaut, g.	Cal.	200,000	5	1,200,000	June '10	0.05
Arizona Copper, pf.	Ariz.	1,426,120	1.20	2,003,391	May '12	0.047
Arizona Copper, com.	Ariz.	1,519,896	1.20	14,230,128	Feb. '12	0.30
Bagdad-Chase, g., pf.	Cal.	84,819	5	202,394	Jan. '09	0.10
Baltic, c.	Mich.	100,000	25	7,050,000	June '11	5.00
Bingham N. H., c.	Utah.	228,690	5	248,481	Mar. '12	0.10
Bonanza Dev., g.	Colo.	300,000	1	1,425,000	Oct. '11	0.20
Bunker Hill Con., g.	Cal.	200,000	1	606,000	May '12	0.07½
Bunker Hill & Sul., l.s.	Ida.	327,000	10	13,453,950	May '12	0.20
Butte & Ballaklava, c.	Mont.	250,000	10	125,000	Aug. '10	0.50
Caledonia, l.s.c.	Ida.	1,300,000	1	52,000	June '10	0.01
Calumet & Arizona, c.	Ariz.	650,000	10	14,285,412	Mar. '12	1.00
Calumet & Hecla, c.	Mich.	100,000	25	116,650,000	Mar. '12	8.00
Camp Bird, g.s.	Colo.	1,100,000	5	7,848,900	Feb. '12	0.48
Centen'l-Eur., l.s.g.c.	Utah.	100,000	5	3,450,000	Apr. '12	1.50
Center Creek, l.z.	Mo.	100,000	10	435,000	Apr. '12	0.05
Champion, c.	Mich.	100,000	25	7,000,000	May '12	1.00
Cliff, g.	Utah.	300,000	1	90,000	Feb. '12	0.10
Cliff, g.	Alas.	100,000	1	140,000	May '11	0.25
Colo. Gold Dredging.	Colo.	100,000	10	125,000	Sept. '11	0.25
Colorado, l.s.g.	Utah.	1,000,000	0.20	2,480,000	Mar. '12	0.03
Columbus Con., g.s.	Utah.	285,540	5	226,832	Oct. '07	0.20
Commercial Gold.	Ore.	1,750,000	1	43,750	Dec. '10	0.00½
Con. Mercur., g.	Utah.	1,000,000	1	3,415,313	July '12	0.03
Continental, z. l.	Mo.	22,000	25	264,000	Jan. '12	0.50
Copper Range Con., c.	Mich.	393,445	100	12,507,265	Apr. '12	0.50
Daly Judge, s.l.	Utah.	300,000	1	315,000	Apr. '12	0.15
Daly West, s.l.	Utah.	180,000	20	6,484,000	Apr. '12	0.30
Doctor Jackpot, g.	Colo.	3,000,000	0.10	90,000	Mar. '11	0.00½
Doe Run, l.	Mo.	65,782	100	2,941,850	Mar. '12	1.50
Elkton Con., g.	Colo.	2,500,000	1	2,991,960	May '12	0.01
El Paso, g.	Colo.	2,450,000	1	1,523,795	Apr. '12	0.01
Fed. M. & S., com.	Idaho.	60,000	100	2,708,750	Jan. '09	1.50
Fed. M. & S., pf.	Idaho.	120,000	100	7,031,250	Mar. '12	1.75
Florence, g.	Nev.	1,050,000	1	840,000	Apr. '11	0.10
Frances-Mohawk, g.	Nev.	912,000	1	546,000	Jan. '08	0.05
Free Coinage, g.	Colo.	10,000	100	180,000	Dec. '09	1.00
Fremont Con., g.	Calif.	200,000	2.50	142,000	May '12	0.02
Frontier, z.	Wis.	1,250	100	133,772	May '12	2.00
Gemini-Key'ne, l.g.s.	Utah.	5,000	100	2,130,000	Oct. '11	6.00
Gold Coin of Victor	Colo.	1,000,000	1	1,350,000	Feb. '09	0.02
Gold King Con., g.	Colo.	5,750,370	1	1,407,319	Dec. '11	0.03
Golden Cycle, g.	Colo.	1,500,000	5	1,980,000	May '12	0.02
Golden Star, g.	Ariz.	400,000	5	140,000	Mar. '10	0.05
Goldfield Con., g.	Nev.	3,558,367	10	21,703,578	Apr. '12	0.50
Grand Central, g.	Utah.	500,000	1	1,420,750	Dec. '11	0.05
Granite, g.	Colo.	1,650,000	1	253,000	Dec. '10	0.01
Hazel, g.	Cal.	900,000	1	711,000	Dec. '10	0.00½
Hecla, l.s.	Idaho.	1,000,000	0.25	2,450,000	May '12	0.02
Hercules, l.s.	Idaho.	1,000,000	1	3,650,000	July '11	0.06
Homestake, g.	S. D.	218,400	100	28,085,040	May '12	0.50
Iowa, g.s.l.	Colo.	1,666,667	1	200,166	June '11	0.00½
Iowa-Tiger Leasing g.s.	Colo.	12,655	1	13,921	Jan. '12	0.10
Iron Blossom, s.l.g.	Utah.	1,000,000	0.10	1,170,000	Apr. '12	0.10
Iron Silver, s.l.g.	Colo.	500,000	20	4,500,000	Jan. '12	0.10
Jamison, g.	Cal.	390,000	10	378,300	Jan. '11	0.02
Jerry Johnson, g.	Colo.	2,500,000	0.10	150,000	Aug. '11	0.01
Kendall, g.	Mont.	500,000	5	1,375,000	Jan. '12	0.02
Kennedy, g.	Cal.	100,000	100	1,831,001	Apr. '10	0.03
King of Arizona, g.	Ariz.	200,000	1	396,000	Aug. '09	0.12
Knob Hill, g.	Wash.	1,000,000	1	45,000	May '12	0.00½
Liberty Bell, g.	Colo.	130,551	5	522,093	Oct. '10	1.00
Little Bell, l.s.	Utah.	300,000	1	75,000	Mar. '11	0.05
Little Florence, g.	Nev.	1,000,000	1	430,000	Jan. '08	0.03
Mammoth, g.s.c.	Utah.	400,000	25	2,220,000	Mar. '08	0.05
Mary McKinney, g.	Colo.	1,309,252	1	933,641	Apr. '12	0.02
May Day, g.s.l.	Utah.	800,000	0.25	108,000	Sept. '08	0.01½
Mexican, g.s.	Nev.	201,600	2.50	20,160	Aug. '11	0.10
Miami, c.	Ariz.	664,993	5	332,496	May '12	0.50
Modoc, g.s.	Colo.	500,000	1	275,000	Dec. '11	0.01
Mohawk M. Co.	Mich.	100,000	25	2,425,000	Feb. '12	1.00
Monarch-Mad'a, g.s.l.	Colo.	1,000,000	1	40,000	May '11	0.01
Montana-Tonop., s.g.	Nev.	921,865	1	330,000	Dec. '11	0.06
Mountain, c.	Cal.	250,000	25	4,216,250	May '08	0.44
National, g.	Nev.	750,000	1	570,000	May '11	0.10
Nevada Con., c.	Nev.	1,999,394	5	7,479,313	Mar. '12	0.37½
New Century, z.l.	Mo.	330,000	1	237,600	Oct. '09	0.01
New Idria, q.	Cal.	100,000	5	1,540,000	Apr. '12	0.30
North Butte, c.	Mont.	410,000	15	10,043,000	Apr. '12	0.40
North Star, g.	Cal.	250,000	10	3,511,988	Mar. '12	0.10
Old Domin'n, M. & Sm.	Ariz.	162,000	25	2,146,000	Apr. '12	1.00
Ophir, s. g.	Nev.	201,600	3	2,068,360	Jan. '12	0.10
Opohongo, g.s.l.	Utah.	898,978	0.25	26,969	Apr. '12	0.01
Oroville Dredging.	Cal.	700,000	5	1,383,036	Dec. '09	0.12½
Osceola, c.	Mich.	96,150	25	10,016,300	Jan. '12	3.50
Parrot, c.	Mont.	229,850	10	7,080,465	May '12	0.15
Pearl Con., g.	Wash.	1,909,711	0.05	181,422	Dec. '10	0.02
Pharmacist, g.	Colo.	1,500,000	1	87,500	Feb. '10	0.00½
Pioneer, g.	Alas.	5,000,000	1	2,041,526	Oct. '11	0.03
Pittsburgh-Idaho, l.	Ida.	1,000,000	1	120,450	Apr. '12	0.04
Portland, g.	Colo.	3,000,000	1	9,037,080	Apr. '12	0.02
Quilp.	Wash.	1,500,000	1	67,500	Feb. '12	0.01
Quincy, c.	Mich.	110,000	25	19,990,000	Mar. '12	1.00
Republic, g.	Wash.	1,000,000	1	85,000	Dec. '10	0.01½
Rochester, l.z.	Mo.	4,900	100	188,396	Dec. '10	0.50
Round Mountain, g.	Nev.	866,426	1	328,404	Sept. '10	0.04
St. Joseph, l.	Mo.	1,000,000	10	8,108,357	Mar. '12	0.15
Shannon, c.	Ariz.	300,000	10	450,000	July '07	0.50
Shattuck-Arizona, c.	Ariz.	350,000	10	1,050,000	Jan. '11	1.00
Silver King Coal. l.s.	Utah.	1,250,000	5	1,659,885	Jan. '10	0.15
Sioux Con., s.l.g.	Utah.	745,389	1	872,097	July '11	0.04
Skidoo, g.	Cal.	1,000,000	5	275,000	May '12	0.02½
Smuggler, l.s.z.	Colo.	1,000,000	1	2,235,000	Nov. '06	0.03
Snowstorm, c.g.	Ida.	1,500,000	$ 1	$ 1,005,000	Aug. '10	$0.01
South Eureka, g.	Calif.	299,981	1	366,881	Apr. '12	0.07
Standard Con., g.s.	Cal.	178,394	10	5,229,809	Jan. '12	0.10
Stratton's Ind., g.	Colo.	1,000,000	0.60	364,500	Apr. '12	0.06
Success, z.	Ida.	1,500,000	1	730,000	May '12	0.02
Tamarack, c.	Mich.	60,000	25	9,420,000	July '07	4.00
Tennessee, c.	Tenn.	200,000	25	2,906,520	Feb. '12	1.50
Tomboy, g. s.	Colo.	300,000	4.85	2,843,100	Dec. '11	0.24
Tom Reed, g.	Ariz.	909,555	1	618,582	May '12	0.04
Tonopah Belm't, s.g.	Nev.	1,500,000	1	2,843,003	Apr. '12	0.25
Tonopah of Nev., s.g.	Nev.	1,000,000	1	8,850,000	Apr. '12	0.40
Tri-Mountain, c.	Mich.	100,000	25	950,000	Dec. '10	1.00
Tuolumne, c.	Mont.	800,000	1	360,000	Aug. '11	0.15
Uncle Sam, g. s. l.	Utah.	500,000	1	495,000	Sept. '11	0.05
United (Crip. Ck.) g.	Colo.	4,000,100	1	440,435	Jan. '10	0.04
United Globe, c.	Ariz.	23,000	10	563,500	Apr. '12	3.00
United Verde, c.	Ariz.	300,000	10	30,097,000	Apr. '12	0.75
Utah, s.l.	Utah.	100,000	10	325,000	Dec. '10	0.02
Utah, c.	Utah.	1,562,599	10	12,694,759	Mar. '12	0.75
Utah Con., c.	Utah.	300,000	5	7,200,000	May '12	0.50
Valley View, g.	Colo.	1,000,000	1	240,000	Dec. '10	0.04
Victoria, g.s.l.	Utah.	250,000	1	207,500	Mar. '10	0.04
Vindicator Con., g.	Colo.	1,500,000	1	2,497,500	Apr. '12	0.03
Wasp No. 2, g.	S. D.	447,900	1	311,966	May '12	0.02
Wolverine, c.	Mich.	60,000	25	7,140,000	Apr. '12	5.00
Work, g.	Colo.	1,500,000	1	172,500	July '08	0.00½
Yak, s.l.	Colo.	1,000,000	1	1,417,685	Oct. '10	0.04
Yankee Con., g.s.	Utah.	1,000,000	1	182,500	July '07	0.01½
Yellow Aster, g.	Cal.	100,000	10	1,081,789	Jan. '12	0.05
Yukon Gold, g.	Alas.	3,500,000	5	3,685,000	Mar. '12	0.07½

Coal, Iron, Industrial and Holding Companies

Amalgamated, c.	Mont.	1,538,879	$100	$68,195,961	May '12	$1.00
Am. Sm. & Ref., com.	U. S.	500,000	100	21,833,333	Mar. '12	0.66⅔
Am. Sm. & Ref., pf.	U. S.	500,000	100	40,333,333	Mar. '12	1.16⅔
Am. Smelters, pf. A.	U. S.	170,000	100	6,600,000	Apr. '12	1.50
Am. Smelters, pf. B.	U. S.	300,000	100	9,857,000	Apr. '12	1.25
American Coal.	Md.	50,000	25	2,759,687	Mar. '12	0.75
Cambria Steel.	Penn.	900,000	50	15,085,000	May '12	0.62½
Central C. & C., com.	Mo.	51,250	100	3,482,500	Apr. '12	1.50
Central C. & C., pf.	Mo.	18,750	100	1,690,933	Apr. '12	1.25
Consolidation Coal.	Md.	190,247	100	20,233,746	Apr. '12	1.50
Greene Cananea.	U. S.	2,471,314	25	618,828	Mar. '12	0.25
Guggenheim, Expl.	U. S.	207,933	100	13,650,320	Apr. '12	2.50
Inter'l Nickel, com.	U. S.	115,826	100	4,847,942	Mar. '12	5.00
Inter'l Nickel, pfd.	U. S.	89,126	100	3,475,811	May '12	1.50
Inter'l Sm & Ref.	U. S.	100,000	100	2,100,000	Mar. '12	2.00
Lehigh Coal & Nav.	Penn.	482,956	50	21,569,220	May '12	1.00
National Lead, com.	N. Y.	206,554	100	6,711,822	Mar. '12	0.75
National Lead, pf.	N. Y.	243,676	100	24,576,899	Mar. '12	1.75
Old Dominion, c.	Ariz.	293,245	25	2,553,490	Apr. '12	0.75
Phelps, Dodge & Co.	U. S.	450,000	100	17,309,304	Mar. '12	2.50
Pittsburgh Coal, pf.	Penn.	297,010	100	14,766,321	Apr. '12	1.25
Texas & Pacific Coal.	Texas.	25,000	100	2,007,530	Mar. '12	1.50
U. S. Steel Corp., com.	U. S.	5,083,025	100	156,281,164	Mar. '12	1.25
U. S. Steel Corp., pf.	U. S.	3,602,811	100	307,244,144	May '12	1.75
U. S. S., R. & M., com.	U.S.-Mex.	486,320	50	4,079,986	Apr. '12	0.00
U. S. Sm., R. & M., pf.	U.S.-Mec.	351,105	50	10,412,045	Apr. '12	0.87½

Canadian, Mexican and Central American Companies

Ajuchitlan, g.s.	Mex.	50,000	$ 5	$ 185,000	Apr. '12	$0.25
Amparo, g.s.	Mex.	2,000,000	1	800,000	May '12	0.05
B. C. Copper.	B. C.	591,709	5	349,130	June '11	0.12½
Beaver Con., s.	Ont.	1,996,490	1	229,912	Apr. '12	0.03
Buffalo, s.	Ont.	1,000,000	1	1,400,000	May '12	0.03
Cobalt Townsite, s.	Ont.	1,000,000	1	50,000	Feb. '12	0.05
Coniagas, s.	Ont.	800,000	5	3,440,000	May '12	0.30
Crown Reserve, s.	Ont.	1,768,814	1	3,979,833	May '12	0.05
Crow's Nest Pass C. Co.	B. C.	248,506	25	2,182,864	Mar. '11	0.25
Dominion Coal, com.	N. S.	150,000	100	4,650,000	Apr. '11	1.00
Dominion Coal, pf.	N. S.	50,000	100	4,565,000	Feb. '12	3.50
Dos Estrellas, g.s.	Mex.	300,000	0.50	6,780,000	Jan. '11	2.50
El Oro, g.s.	Mex.	1,147,500	4.85	8,295,564	Dec. '11	0.36
Esperanza, s.g.	Mex.	455,000	4.85	10,669,280	Jan. '12	0.36
Granby, s.l.c.	B. C.	148,496	100	4,197,111	Dec. '10	1.00
Greene Con., c.	Mex.	1,000,000	10	6,794,400	Mar. '12	0.60
Guanajuato D., pf., s.	Mex.	10,000	1000	274,356	Jan. '11	3.00
Hedley Gold.	B. C.	120,000	10	564,000	Mar. '12	0.50
Kerr Lake s.	Ont.	600,000	5	3,870,000	Mar. '12	0.25
La Rose Con., s.	Ont.	1,498,407	5	2,764,523	Apr. '12	0.12½
Le Roi No. 2, g.	B. C.	120,000	£4.30	1,399,680	Aug. '11	0.48
Lucky Tiger Com., g.	Mex.	715,337	10	1,498,622	Apr. '12	0.20
McK.-Dar. Sav. s.	Ont.	2,247,692	1	2,382,551	Apr. '12	0.10
Mines Co. of Am. (new).	Mex.	1,700,000	10	*877,500	Jan. '12	0.15
N. Y. & Hond. Ros.	C. A.	150,000	10	3,082,500	Mar. '12	0.15
Nipissing, s.	Ont.	1,200,000	5	8,190,000	Apr. '12	0.37½
Peñoles, s.l.g.	Mex.	80,000	25	*5,611,688	Mar. '12	1.25
Peregrina M. & M., pf.	Mex.	10,000	100	328,656	Sept. '10	3.50
Pinguico, pf., s.	Mex.	20,000	100	600,000	Oct. '11	3.00
Right of Way Mns'ts.	Ont.	1,685,500	1	202,260	Dec. '11	0.02
Rio Plata, s.	Mex.	373,437	5	354,990	Mar. '12	0.10
San Rafael, g.s.	Mex.	2,400	25	1,437,624	Jan. '12	2.00
San Toy, g.s.	Mex.	6,000,000	1	360,000	Dec. '11	0.10
Sopresa, g.s.	Mex.	19,200	20	1,517,438	Jan. '11	34.00
Stand'd Silver-Lead.	B. C.	2,000,000	1	75,000	May '12	0.02½
Temiskaming, s.	Ont.	2,500,000	1	1,084,155	Apr. '12	0.03
Tem. & Hud. Bay, s.	Ont.	7,761	1	1,567,722	Mar. '12	3.00
Trethewey, s.	Ont.	1,000,000	1	761,998	July '11	0.10
Wettlaufer-Lorrain, s.	Ont.	1,416,590	1	354,147	Apr. '12	0.05

*Previous to reorganization, $5,258,881.

†Previous to January, 1910, $324,644.

INDUSTRIALS

The Pittsburgh Testing Laboratory announce that they have opened an office at 204 White Building, Seattle, Washington, in charge of C. A. Perkins, district manager.

The Denver Fire Clay Company announces that it has been appointed sole American sales agent for the Cyanide Antidote Set which is approved and recommended by the Victorian Mines Dept., of Australia.

Dayton Malleable Iron Co., Dayton Ohio, have recently perfected an iron which it is claimed resists sulphuric and nitric acid. The selling company is the Duiron Castings Co., No. 90 West St., New York City, N. Y.

F. Weber & Co., of Philadelphia, have recently put out a new "Universal" Slide Rule for which they claim the special feature of Automatic Adjustment. The stock, in the center, is cut almost through and three steel springs, hidden from view, connect both sides, insuring free and easy motion to the slide, under all climatic conditions. Another of the good features claimed for this rule is that there are no screws to tamper with. It is lined with white celluloid.

The Winnipeg Branch of the H. W. Johns-Manville Company, owing to their increasing business in Asbestos, Magnesia and Electrical supplies, has found it necessary to move into new quarters at No. 92 Arthur Street, Winnipeg, on or about June 1st.

This is a six-story and basement building, 100 feet deep and 50 feet wide, and will be occupied throughout by the Company's offices and store-rooms. By reason of this move, a much larger and more complete stock of goods will be carried on hand than heretofore, and a larger force will be employed to look after the Company's interests.

The Duff Mfg. Co., of Pittsburgh, Pa., manufacturers of Barret Lifting Jacks, have purchased five acres of ground on Preble Ave. Northside, Pittsburgh, on the lines of the Pennsylvania and B. & O. Railroads, and will start at once the erection of a new factory, which, they say, will be the largest in the world devoted exclusively to the manufacture of lifting jacks. The new site of the Duff Manufacturing Company's factory, and the new site of the Pittsburgh Screw and Bolt Co. occupies the Riter-Conley Company's property and adjacent acreage, totalling about 12 acres and is close to the plants of the Pressed Steel Car Co., the Standard Sanitary Mfg. Co., and the Edith Furnace of the Carnegie Steel Company. The construction work on the factory and office buildings will commence about July 1st.

The Western Electric Company, on June 1st, formally opened a large warehouse and branch office at Houston, Texas, in order to handle more effectively the growing business in the Gulf Coast. This move of the company is a recognition of Houston's superior position as a shipping point and a center for buyers of electrical goods. Several of the South's largest railroads enter the city, a fact which makes it possible to give excellent service to customers.

The new house will be operated as a branch of the Dallas organization under the supervision of R. W. Van Valkenburgh and Paul Joyslin, manager and sales manager, respectively. The local organization will have as its resident heads, H. P. Hess, in charge of sales; F. G. Caldwell, in charge of store, and M. A Schon in charge of warehousing. Complete stocks of telephone, power, supply and line material will be carried.

TRADE CATALOGS

Damascus Bronze Co., Pittsburgh, Pa. Catalog. Illustrated, 24 pp., 6x8¼ in.

Berger Mfg. Co., Canton, Ohio. Treatise on Metal Lumber. Illustrated.

Jeffrey Mfg. Co., Columbus, Ohio. General Catalog. Illustrated, 576 pp., 6¼x9¼ in.

Electric Storage Battery Co., Philadelphia, Pa. Bulletins 131, 133, 134, 135. 8x10½ in.

Nelson Valve Co., Philadelphia. Catalog 8—Steel Valves and Fittings. Illustrated, 64 pp., 5x7¼ in.

Lidgerwood Mfg. Co., New York. Bulletin No. Cableways for lock and dam work. Illustrated.

Ingersoll-Rand Co., 11 Broadway, New York, Bulletin—"Jackhamer Drills." Illustrated, 12 pp., 6x9 in.

National Tube Co., Pittsburgh, Pa. Booklet, "The Modern Boiler Tube." Illustrated, 39 pp., 8x10½ in.

Hazard Mfg. Co., Wilkes-Barre, Pa. Booklet—Hand Forged Wire Rope Fittings. Illustrated, 24 pp., 5x6½ in.

Thomson Electric Welding Co., Lynn, Mass. Catalog. Electric Welding Machines. Illustrated, 72 pp., 6x9 in.

Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Booklet, Private Telephone Systems. Illustrated, 24 pp., 3½x6 in.

Robins Conveying Belt Co., Park Row Bldg., New York. Bulletin 50. Coal, coke and ash handling. Illustrated, 40 pp., 6x9 in.

The Hayward Co., 50 Church St., New York. Pamphlet No. 588. Buckets and Digging Machinery. Illustrated, 8 pp., 6x9 in.

Weston Electrical Instrument Co., Newark, N. J. Bulletin No. 8. Miniature Precision Direct Current Instruments. Illustrated, 32 pp., 8x10½ in.

Vanadium Babbitt Metal

The Enterprise Metal Co., of Syracuse, N. Y., is putting a novelty in bearing metals on the market in the shape of a vanadium babbitt. The alloy is made up approximately as follows: 100 parts tin; 12 parts antimony; and 8 parts copper and vanadium. In making up the alloy, the copper and vanadium are melted together and poured into a mixture of molten Straits tin and antimony. The use of the vanadium is said to permit the use of more than the average amount of copper usually found in an alloy of this type.

The vanadium is stated to give a denser grain than is found in ordinary babbitts, giving exceptional tensile and compression strength, while the melting point is stated to be just about as usual.

Bearings made of this metal were used in the Flanders "20" car, which ran 10,872 miles without its engine stopping. Another company tested a bearing with a 300,000-revolution run, 1500-lb. pressure, on a 3-sq.in. bearing surface. The loss was 0.0042%, the average temperature was 74.4° F. and the coefficient of friction 0.0035. The use of vanadium is stated to add 100% to the life of the bearing.

Automatic Steel-Tube Making

The Wells-Lloyd Co., of Menominee, Mich., reports that it has a machine in operation for the manufacture of steel tubing, which is the first automatic machine for this purpose in the world. The steel, as supplied by the mills in flat form, is placed on one side of the machine in the form of a roll. The machine forms it into round, square or other shapes, and welds the metal with the aid of oxy-acetylene gas, draws the welded tube to exact size and shape, straightens it, and finally cuts it in any desired length, without stopping the movement of the tube through the machine. Starting with the flat stock and ending with the finished tube, the material is not touched by the human hand in any stage of the process.

Forged Steel Pipe Fittings

Engineers will appreciate the forged-steel pipe castings turned out by the American Spiral Pipe Works of Chicago. These are forged from a single piece of openhearth steel, without a weld. As a consequence, boiler nozzles made under this system can be heated and the saddle flange bent to the required curvature, and there is nothing to become loose when the forging is heated. The saddle flange is of sufficient diameter to enable power riveters to be used in attaching the nozzle.

On comparative tests between the new style of flanges and those of other materials, a cast-iron flange broke through every rivet hole at a test which left the forged-steel flange entirely untouched. Extra-heavy malleable-iron and cast-steel flanges were bolted to forged-steel flanges and the pairs pressed together. Both the malleable-iron and forged-steel flanges dished badly, the cast-steel remained unaffected.

The use of these fittings seems generally indicated where high pressures are to be employed, or where there will be many alternate contractions and expansions. As compared with cast iron, there is a great advantage in that no carelessness of the workman can crack them during erection.

Lodwic Concentrator Litigation

It is stated on advertising page 48, of the ENGINEERING AND MINING JOURNAL, June 8, 1912, that the United States District Court of the Southern District of California on Mar. 5, 1912, granted a perpetual injunction against all persons claiming or pretending to have any interest in or rights under the Lampert patents. The Court did nothing of the kind. The injunction issued in this case enjoined Jacob Lampert and P. B. McCabe, their agents, attorneys, servants and employees from claiming to have by virtue of the Lampert patents any rights in the invention covered by the Wilfley patents. The Court did not declare the Lampert patents invalid. The Lodwic Concentrator Co. is manufacturing a table which is covered by the claims of the Lampert patents.

Our attorneys are preparing papers for an appeal of this suit to the Appellate Court. In the meantime we hope you will give us the benefit of a correction of the item referred to.

THE LODWIC CONCENTRATOR COMPANY,
Geo. L. Knight, President.
Los Angeles, June 15, 1912.

AMERICAN STEEL & WIRE CO'S

AMERICAN WIRE ROPE

IN ALL STANDARD FORMS OF CONSTRUCTION.
NON-SPINNING FLATTENED STRAND & FLAT MADE OF SWEDES IRON, CRUCIBLE CAST STEEL AND MONITOR PLOW STEEL.

HOISTING rope of every description for elevators, mines, coal hoists, ore hoists, conveyors, derricks, stump pullers, steam shovels, dredges, logging, ballast unloaders, etc. Towing hawsers, mooring lines, tiller rope and ships' rigging. Mine and surface haulage rope, street railway cable and power transmission rope, suspension bridge cables, cableway ropes, guy strands and sash cords. Flat rope for deep hoisting. Special rope made to order.

Copper cable and strand for all electrical purposes. Fittings and appliances for use with wire rope

Read about wire rope usage in its different requirements in *American Wire Rope News*. Gladly sent free to anyone upon request.

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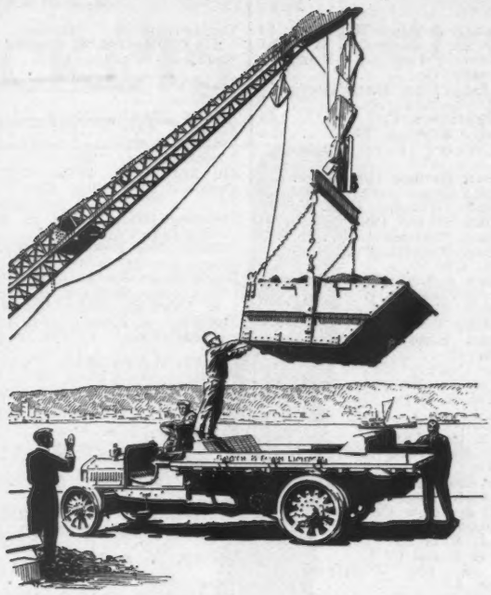

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Measure truck value by

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Write for data on what motor trucks do for Engineers and Contractors. Consult our Engineering Department direct or through any representative.

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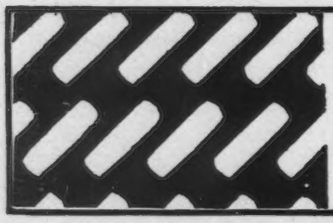

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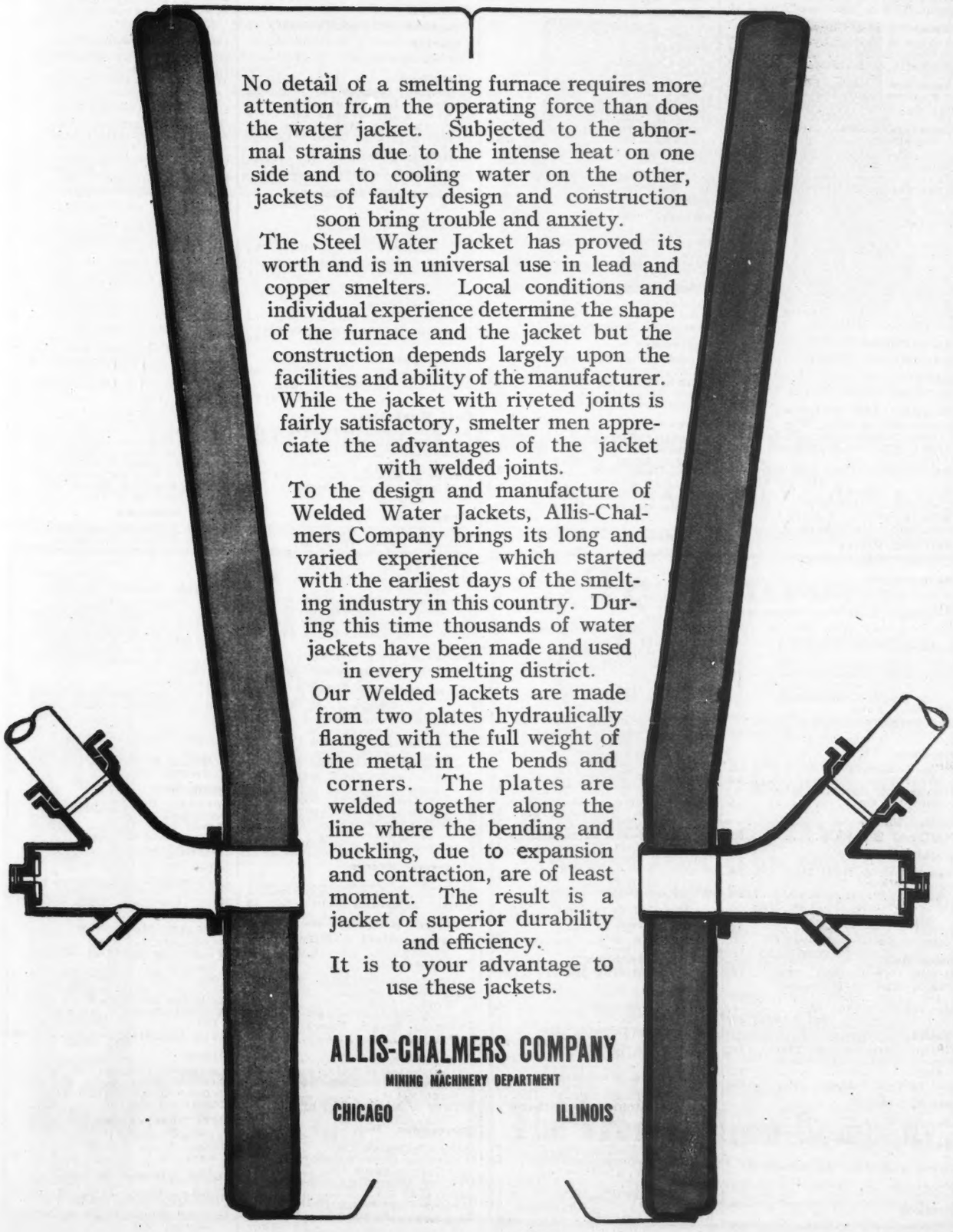

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The Steel Water Jacket has proved its worth and is in universal use in lead and copper smelters. Local conditions and individual experience determine the shape of the furnace and the jacket but the construction depends largely upon the facilities and ability of the manufacturer. While the jacket with riveted joints is fairly satisfactory, smelter men appreciate the advantages of the jacket with welded joints.

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MINING MACHINERY DEPARTMENT

CHICAGO ILLINOIS

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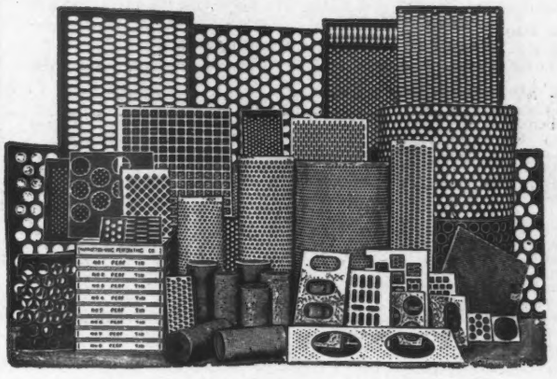

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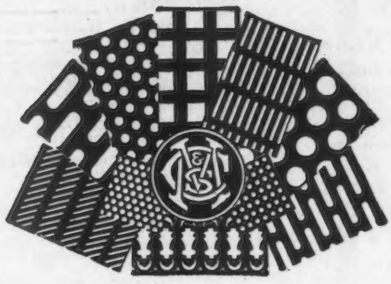

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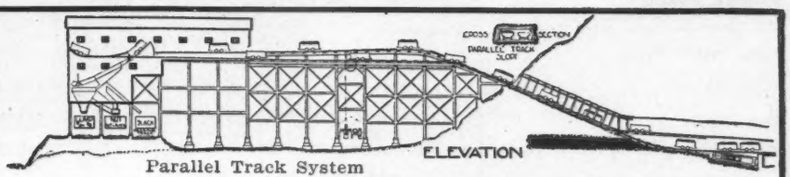

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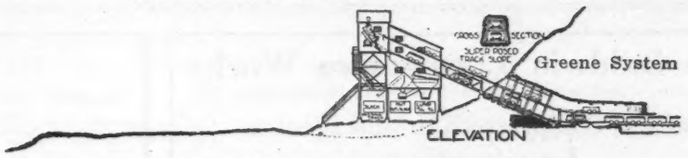

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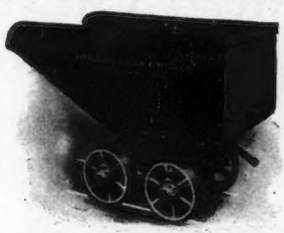

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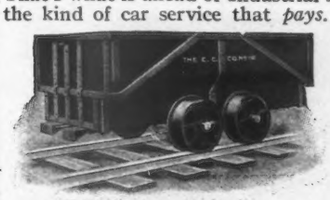

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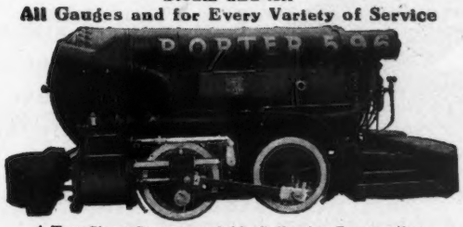

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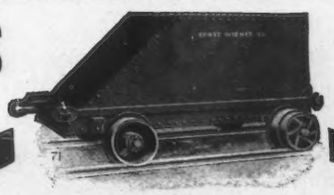

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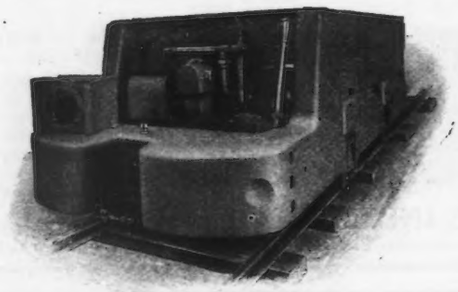

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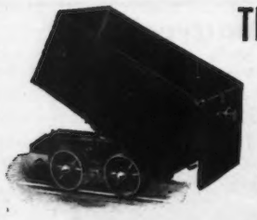

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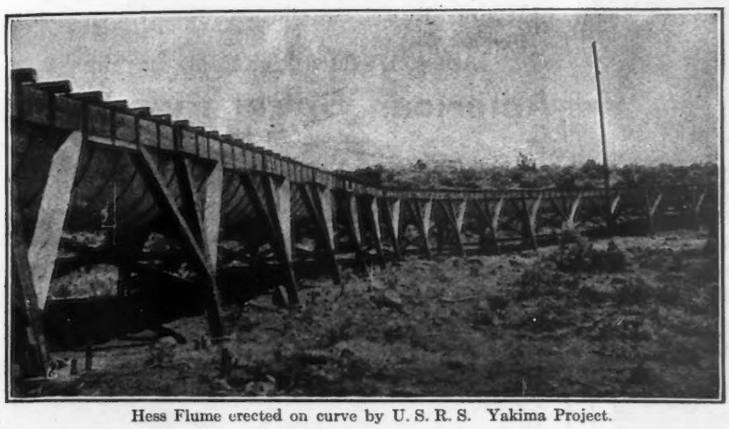

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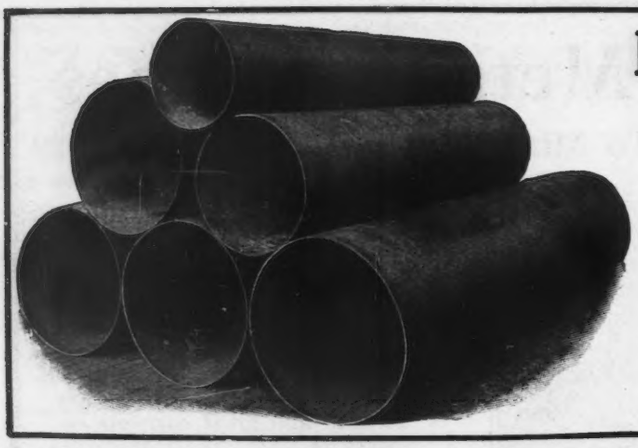

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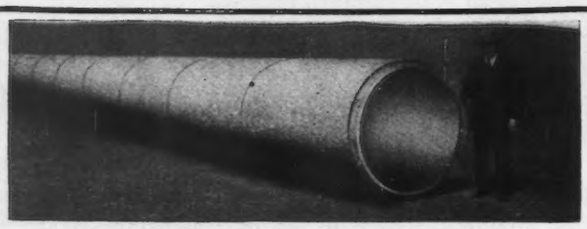

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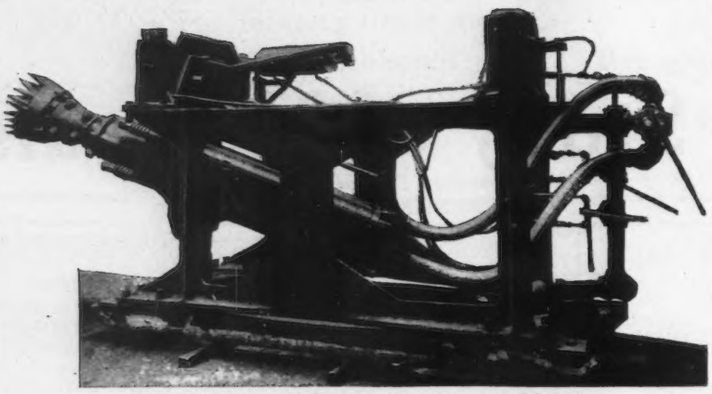

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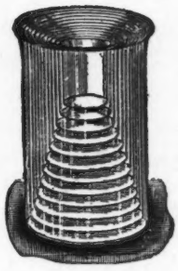

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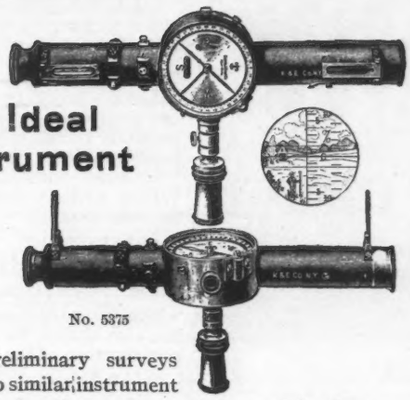

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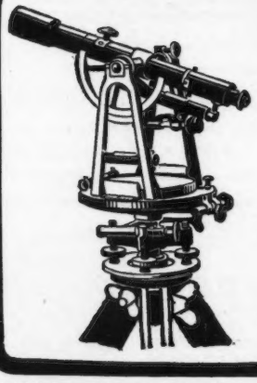

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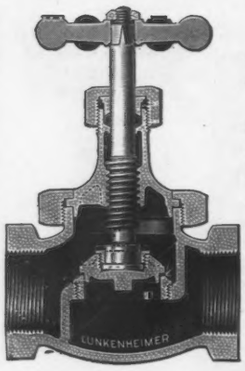

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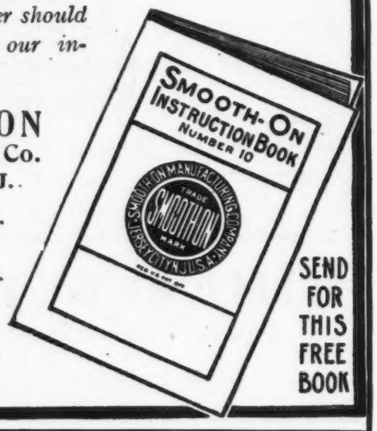

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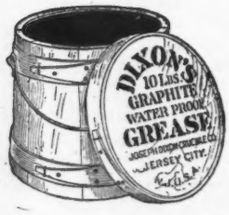

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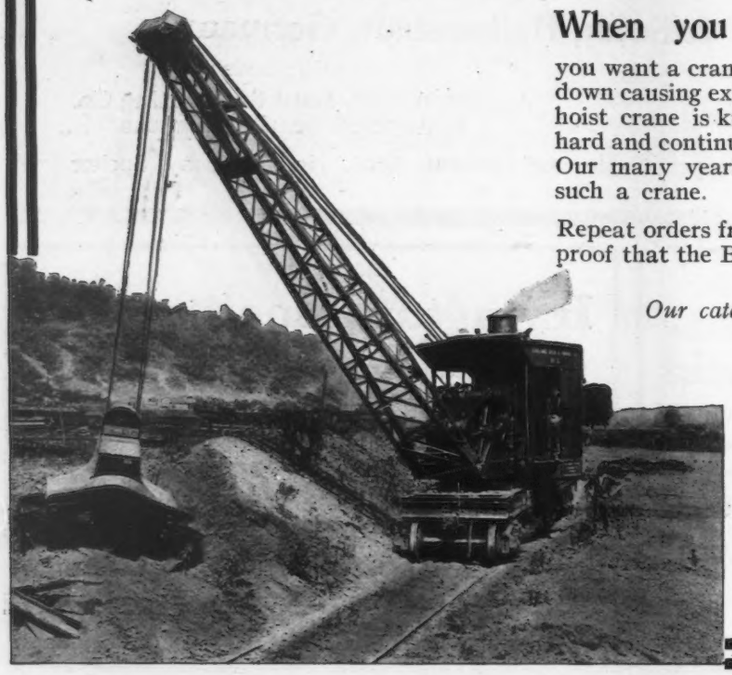

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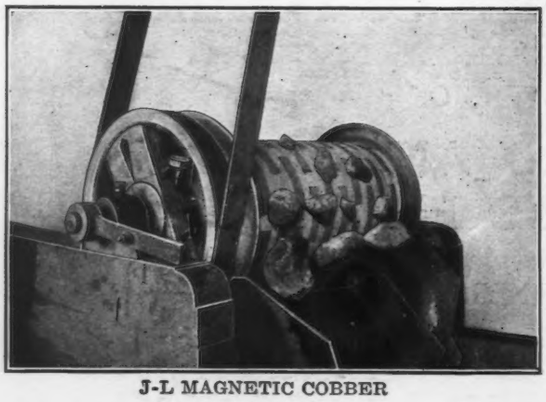

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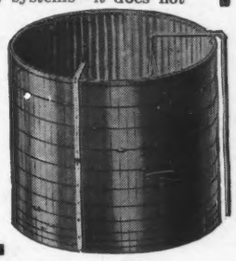

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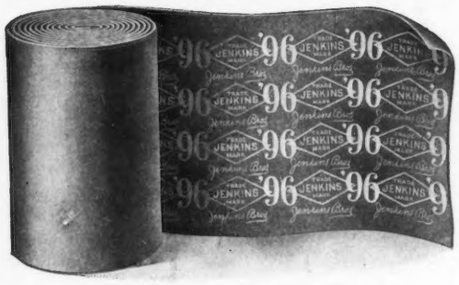

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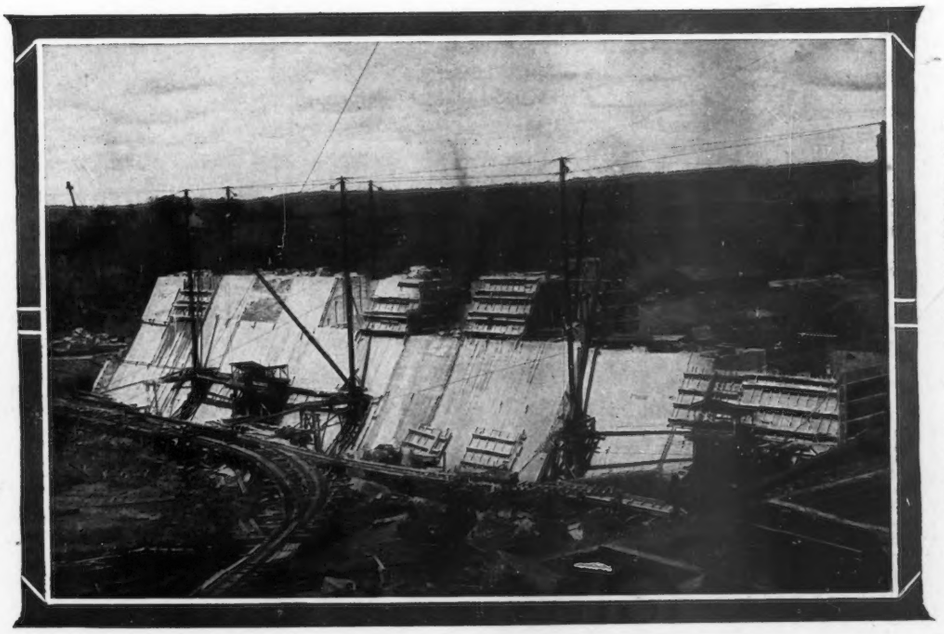

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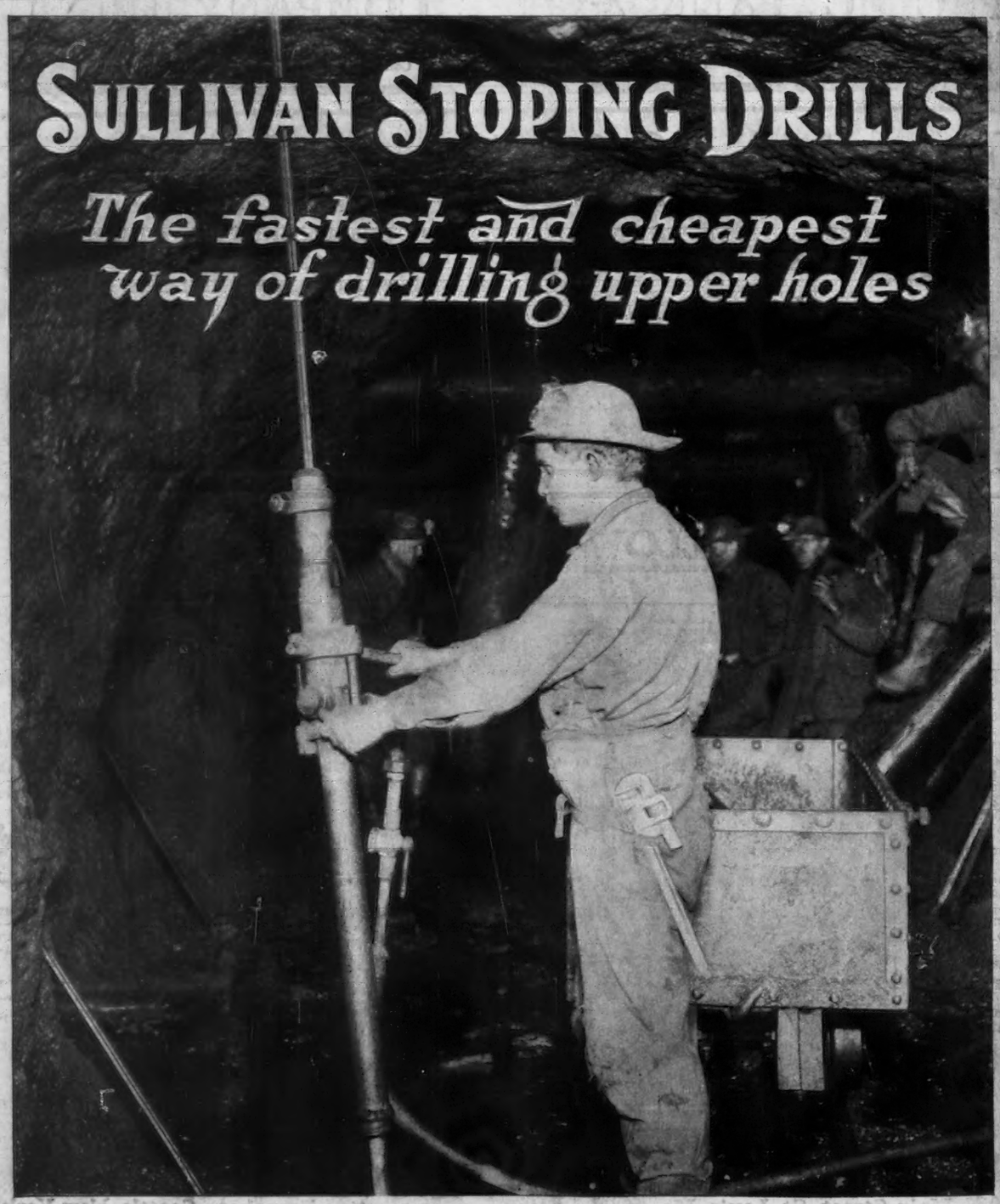
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